DOCUMENT RESUME

ED 229 511 CE 032 715

TITLE	Classification Structures for Career Information. Volume III: Technical Information. Interim Edition.
INSTITUTION	Ohio State Univ., Columbus. National Center for Research in Vocational Education.; Wisconsin State Occupational Information Coordinating Council, Madison.; Wisconsin Univ., Madison. Vocational Studies Center.
SPONS AGENCY	National Occupational Information Coordinating Committee (DOL/ETA), Washington, DC.
PUB DATE	81
GRANT	99-0-1449-17-17
NOTE	200p.; For related documents, see CE 032 708-714.
PUB TYPE	reference Materials - Vocabularies/Classifications/Dictionaries (134)
EDRS PRICE	MF01/PC08 Plus Postage.
DESCRIPTORS	Career Counseling; Career Guidance; Career Planning; Careers; Computer Oriented Programs; *Databases; Definitions; Employment Qualifications; Information Systems; *Occupational Clusters; *Occupational Information; Occupational Surveys; *Occupations; Online Systems; Reference Services
IDENTIFIERS	Career Information Delivery Systems; *Dictionary of Occupational Titles; *Standard Occupational Classification

ABSTRACT

"Classification Structures for Career Information" was created to provide Career Information Delivery Systems (CIDS) staff with pertinent and useful occupational information arranged according to the Standard Occupational Classification (SOC) structure. Through this publication, the National Occupational Information Coordinating Committee (NOICC) provides technical assistance to states to assist them in converting their existing CIDS to a SOC structure. A secondary purpose for the publication is to provide counselors with a compendium of occupational information compiled from a great variety of sources. The publication is organized in three volumes. This third volume, subtitled "Technical Information," contains detailed explanations of the Dictionary of Occupational Titles (DOT) occupational and educational classification systems, suggested uses for the entire publication, a brief glossary of terms, and a bibliography. (KC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED229511

NOICC

National Occupational Information Coordinating Committee

CLASSIFICATION STRUCTURES FOR CAREER INFORMATION

VOLUME III

TECHNICAL INFORMATION

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

✓ This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

INTERIM EDITION
1981

CE032715

CLASSIFICATION STRUCTURES
FOR
CARAREER INFORMATION

Staff

Wisconsin Occupational Information Coordinating Council
Shelley Cary, Director

Vocational Studies Center, University of Wisconsin-Madison
Merle E. Strong, Director

Roger Lambert - Project Co-Director

David Caulum - Project Co-Director
Author: Volume III, Technical Information

Ron Myren - Computer Systems Analyst

Nancy Howard - Author: Occupational Statements

The National Center for Research in Vocational Education
Robert E. Taylor, Director

Harry Drier - Project Director

Fred Williams - Specialist

Consultant
Melinda Salkin - Author: Occupational Statements

These materials were developed under a grant with the Wisconsin Occupational Information Coordinating Council and subcontracted to the Vocational Studies Center and the National Center. A separate contract was written with Melinda Salkin. The National Occupational Information Coordinating Committee (NOICC) funded this research and development. Any opinions expressed, unless so stated, do not necessarily reflect position or policy of NOICC.

Project Officer, John Van Zant
NOICC
Grant No. - 99-0-1449-17-17

CLASSIFICATION STRUCTURES FOR CAREER INFORMATION

CSCI

Volume I: Occupational Statements

Part 1: SOC Numbers 1099 to 4490
Part 2: SOC Numbers 4499 to 6560
Part 3: SOC Numbers 6699 to 9900
Numeric Index

Volume II: Occupational Characteristics

Part 1: SOC Numbers 1099 to 4490
Part 2: SOC Numbers 4499 to 6560
Part 3A: SOC Numbers 6699 to 7679
Part 3B: SOC Numbers 7700 to 9900
Numeric Index

Volume III: Technical Information

* * * * * * * * * * * * * *

TABLE OF CONTENTS

Volume III: Technical Information

Foreword i

Acknowledgements iii

I. Introduction v
  Background v
  Purpose vii
  Organization of Volumes vii

II. Orientation to the CSCI viii
  Orientation to the Standard Occupational Classification . . . viii
  Organization of the Occupational Statements ix
  Organization of the Occupational Characteristics ix

III. Description of Tables in Volume II of the CSCI xi
  Overview of the Tables xi
  Worker Traits and Classification Codes in the Tables xi

IV. Use of the CSCI in Career Information Delivery System (CIDS) Development xv
  Overview xv
  Using SOC in Title Selection and Content Development xv

Pages

Volume III: Technical Information 1-172

Appendix A: NOICC Administrative Memorandum 81-23 1-8

Appendix B: Description of the Standard Occupational Classification (SOC) System from Vocational Preparation and Occupations (1981) 9-13

Appendix C: Description of the Occupational Employment Survey (OES) Program from Vocational Preparation and Occupations (1981) 14-25

Appendix D: Description of the United States Office of Education (OE) Classification System from Vocational Preparation and Occupations (1981) 26-29

Appendix E: Description of the Coding Structure in the Guide to Occupational Exploration (1979) 30-36

Appendix F: Description of Worker Functions from the Handbook for Analyzing Jobs (1972) 37-47

Appendix G: Summary of Worker Trait Codes from the Handbook for Analyzing Jobs (1972) 48-50

Appendix H: Description of the GED and SVP from the Handbook for Analyzing Jobs (1972) 51-71

Appendix I: Description of the Worker Traits, Physical Demands and Environmental Conditions from the Handbook for Analyzing Jobs (1972) 72-84

Appendix J: Description of the Worker Traits, Aptitudes, from the Handbook for Analyzing Jobs (1972) 85-146

Appendix K: Description of the Worker Traits, Temperaments, from the Handbook for Analyzing Jobs (1972) 147-163

Appendix L: Glossary of Terms Used in SOC Definitions 164-172

FOREWORD

One of the major purposes of the National Occupational Information Coordinating Committee (NOICC) is to encourage the use of occupational information. This purpose, contained in the enabling legislation, states: ". . . labor market information, including career outlook and other appropriate information required by youth in matching career desires with available and anticipated labor demand, shall be encouraged and supported by the National Occupational Information Coordinating Committee (NOICC)."

NOICC's thrust to fulfill this mandate, beginning in 1979, has been through the Career Information Delivery Systems (CIDS) competitive grant program. Since the beginning of the program, NOICC has encouraged these systems to use the Standard Occupational Classification (SOC) as the primary means for organizing the information contained in them. NOICC has established minimum requirements for use of the SOC structure by State Occupational Information Coordinating Committees receiving CIDS grants in NOICC Administration memorandum no. 81-23.

The SOC should prove to be an effective tool linking information on occupational outlook information with personal occupational desires referred to in the legislation. However, before the SOC could be effectively used in the CIDS, two preliminary tasks had to be completed: 1) relationships between the SOC and other existing data systems had to be established, and 2) the definitions published in the 1980 edition of the SOC manual had to be expanded and rewritten for occupational guidance purposes. Fortunately much of the first task has already been completed through another NOICC project, the development of the publication Vocational Preparation and Occupations (VPO). This publication establishes linkages between currently used educational and occupational coding structures.

To accomplish the second task, NOICC initiated a new project to modify the SOC definitions and organize the existing VPO crosswalks between classification systems so they could be used for CIDS purposes. The results of this effort are published in this document, the Classification Structures for Career Information (CSCI).

This edition of Classification Structures for Career Information has been published as an interim edition. This was done because the short time available to complete this effort did not permit a comprehensive technical edit of the occupational statements. Furthermore, there is a plan to convert the current educational classification codes contained in these tables to the new Classification of Instructional Programs in the near future.

The NOICC staff feels that this interim edition incorporates the latest information concerning the interrelationships of occupational and educational classification systems. This publication can serve as the primary source of information for CIDS information developers, counselors and other persons seeking information regarding to the world of work.

This important work was completed through the efforts of a large number of people and organizations. It is our sincere hope that the Classification Structures for Career Information will be a useful document not only for the technicians of CIDS but also for counselors and others who have a need for occupational information.

RUSSELL B. FLANDERS
Executive Director

ACKNOWLEDGMENTS

The National Occupational Information Coordinating Committee (NOICC) is appreciative of the cooperation, support and contributions of a number of agencies, organizations, other entities, and individuals who have participated in the development of the Classification Structures for Career Information.

This publication is the principal product of a grant awarded by NOICC to the Wisconsin State Occupational Information Coordinating Committee (WSOICC). Dr. Shelley Cary, Executive Director of WSOICC, served as the grant manager. The Vocational Studies Center, University of Wisconsin-Madison, was the prime contractor for the grant; Dr. Roger Lambert served as the Director; Dr. David Caulum was the principal researcher; and Dr. Ron Myren was the computer systems analyst. The National Center for Research in Vocational Education was another contractor on the project. Under the direction of Dr. Harry Drier, Fred Williams and Linda Pfister provided technical support and evaluation services for the development of the guidance-based SOC definitions. Dr. Melinda Salkin, formerly of the North Carolina SOICC, served as the principal definition writer. Nancy Howard wrote and edited all aggragate definitions.

For review purposes, and to provide procedural recommendations and other technical services, a Special Task Force was formed. The members of this Task Force were: John Van Zant-DC, Shelley J. Cary-WI, Carol Voss-WI, Roger Lambert-WI, David Caulum-WI, Ron Myren-WI, Darcy Mellen-Sullivan-WI, Jane Kwiecinski-WI, Harry Drier-OH, Fred L. Williams-OH, Melinda Salkin-NC, Linda Kobylarz-CT, Bruce McKinlay-OR, Dick Hall-OH, David Neideffer-DC, Bill Woolley-FL, Elton Mendenhall-NE, Thelma Lennon-NC, Hartley Jackson-WI, Bob Alexander-DC, Walton E. Webb-DC, Wynonia Dunn-DC, Helena Kennedy-WA, Eleanor Morgenthau-FL, Carol Kososki-SC, Joseph McGarvey-MI, Jan Staggs-IL, Todd Strohmenger-WV, Emanuel Weinstein-DC, and Bill Erpenbach-WI.

The Task Force was divided and augmented into other sub-groups that met on a regional basis to review the SOC guidance-based definitions. The members of these sub-groups were:

Columbus, Ohio:
Linda Kobylarz-CT, Norm Gysbers-MO, Bob Alexander-DC, Joe McGarvey-MI, Eugene Marquardt-WI, Rod Durgin-OH, Jack Ford-OH, Jan Staggs-IL, Cathy Arrowsmith-OH, Shelley Cary-WI, Walt Webb-DC, Harry Drier-OH, Fred Williams-OH, Melinda Salkin-NC, John Van Zant-DC, Darcy Mellen-Sullivan-WI

Raleigh, North Carolina:
Todd Strohmenger-WV, Emanuel Weinstein-DC, Bill Wooley-FL, Michael Pilot-DC, Thelma Lennon-NC, Sumyyah Bilal-FL, Carie Ann Blankenship-SC, Lawrence K. Jones-NC, Mary Nell Right-AL, Linda Pfister-OH, Fred Williams-OH, Melinda Salkin-NC, John Van Zant-DC

San Diego, California:
Elton Mendenhall-NE, Ed Whitfield-CA, Helenea Kennedy-WA, Robert Ponce-CA, Wonna Dunn-DC, J.W. Rawlins-CA, Bill Sharp-AZ J. Sue Bartlett-MT, Walter Gembica-CA, Larry Johnson-CA, Gene Jurado-CO, Jerry Miller-CA, Beverly Postlewarite-WA, Barbara Hickethier-Priece-CA, Fred Williams-OH, Melinda Salkin-NC, John Van Zant-DC, Nancy Howard-WI

The member agencies of NOICC also provided critical contributions to the development of this document through their earlier efforts on a related and companion document, Vocational Preparation and Occupations (VPO). Many of the computer tapes, code crosswalks, and explanations of data systems prepared for the VPO were utilized for this publication.

NOICC's member agencies are the Bureau of Labor Statistics, the Employment and Training Administration, the Office of Vocational and Adult Education, and the National Center for Education Statistics. In addition, the Office of Federal Statistical Policy and Standards of the Office of Management and Budget provided computer tapes and technical assistance relative the 1980 Standard Occupational Classification (SOC).

NOICC recognizes and thanks the following individuals for their special assistance in preparing this publication:

Milo Peterson:
Office of Federal Statistical Policy and Standards

Peggy Brennan:
Researcher, VPO Special Projects Unit, Ventura County Superintendent of Schools

NOICC staff direction and technical support was provided by:

Emanuel Weinstein, Classification System Specialist; John Van Zant, Project Monitor and text contributor; Walton E. Webb, Coordinator of State and Interagency Network, who provided general supervision; Russell E. Flanders, Executive Director, who provided general direction.

I. INTRODUCTION

Background

To carry out the legislative mandates contained in P.L. 94-482 (the Education Amendments of 1976), and P.L. 95-524 (the Comprehensive Employment and Training Act Amendments of 1978), NOICC's Technical Steering Group adopted a number of policies. Among them (as published in the Federal Register) is one which adopts the Standard Occupational Classification as NOICC's overall occupational classification system. The SOC was designed to establish a standard coding system and nomenclature for use in identifying, classifying and codifying occupations. The structure of the SOC provides the CIDS with an organizing scheme that groups occupations with similar worker functions. This feature can be used to expand the occupational choice or options of the CIDS user. The feature also facilitates development of the CIDS user's understanding of the functional relationships among different occupations.

The SOC structure also permits an expansion of titles available within a CIDS. There are 834 separate SOC titles. Most of these are directly related to groups of Dictionary of Occupational Titles (DOT) codes. This means that the 834 SOC titles are matched with 12,099 defined base DOT titles. This arrangement enhances the selection of occupational titles appropriate for a particular State need.

As presented in the 1980 SOC Manual, the SOC structure is composed of a four-level system: Division, Major Group, Minor Group and Unit Group. Each SOC grouping or category represents a collection of occupations which are sufficiently similar in their main tasks to be grouped under a common title. Fundamental to each SOC Division are the various categories. These categories are arranged from general to progressively more specific level of occupational detail. Because of this structure, it is possible to aggregate or disaggregate categories under a particular SOC Division according to the level of detail required.

Given the advantages of the SOC and the NOICC Policy, NOICC staff approached the implementation of the SOC Policy in a developmental way. It has proceeded with the SOC implementation with as much interagency and field input as possible. To assess the impact of a SOC/CIDS requirement to "use the SOC as a standard structure for the presentation of occupational information in CIDS's funded under the CIDS Grant Program," NOICC held a meeting with a variety of CIDS experts. These included representatives from NOICC's statutory agencies, NOICC staff, nonprofit and commercial organizations, and the CIDS assistance staff from the National Governors' Association.

The major conclusion of this group was that the SOC definitions were not suitable for use in a CIDS. Their review of the SOC indicated that more details about worker functions were needed to facilitate use of SOC definitions in a CIDS.

The group advised NOICC that all CIDS would have the same problem. Therefore, they recommended that NOICC should sponsor a project to modify or convert the existing definitions for use in CIDS. To avoid potential duplication of effort among the CIDS grantees and to fulfill another NOICC mandate to establish standard definitions, NOICC initated a Special Purpose Grant with the Wisconsin SOICC. The end products of this project are this publication and a computer tape. In July 1980, a project task force was convened by NOICC for the purpose of establishing criteria and guidelines for the development of the guidance-based definitions. This task force was comprised of representatives from career information delivery systems, occupational information coordinating committees, professional educators, representatives from various federal agencies, and NOICC staff. (The task force membership is included in the Acknowledgment.) The specific charge of this task force was to develop the parameters for the definitions contained in Volume I and to recommend procedures to develop composite attribute and classification coding for the various SOC groups contained in Volume II.

Definition development recommendations of the task force included the following:

1. A general description of no more than 540 characters should be developed for each occupational group and should focus upon the activities included under the specific DOT titles within the group;

2. A section of sample work activities from representative DOT titles within each occupational group should be included;

3. A statement covering the hours of work and travel requirements, if any, for the occupational titles within the group should be developed;

4. Typical places of employment should be listed. Additionally, the definitions were to be written for a 6th to 8th grade reading level. However, the task force was unable to agree upon specific methodology to be used in measuring the readability of the definitions.

The task force recommendations for developing the composite attributes were difficult to fulfill. Consideration had to be given to a variety of factors: what other classification systems should be related and aggregated for each SOC group; which variables describing worker traits, interests, and aptitudes, etc., should be included; and how should the aggregation and compilation be completed. The tables contained in this publication were designed to carry out the intent if not the letter of the task force recommendations.

Purpose

The primary purpose of this publication is to provide CIDS staff with pertinent and useful occupational information arranged according to the Standard Occupational Classification (SOC) structure. Through this publication NOICC is providing technical assistance to states to assist them in converting their existing CIDS to a SOC structure. A secondary purpose for this publication is to provide counselors with a compendium of occupational information compiled from a great variety of sources. This publication compiles all of the background information used in preparing the Dictionary of Occupational Titles (DOT) as well as numerous other occupational and educational codes into one source document. This feature should save a researcher or information developer an enormous amount of time.

Organization of The Volumes

Because of the vast amount of detailed information contained in the entire Classification Structures for Career Information, it was necessary to publish it in separate volumes.

The first volume, divided into three parts, contains the 1980 Standard Occupational Classification (SOC) codes and titles as well as the new guidance-oriented definitions. Other selected information reflective of the group of individual occupations assigned to a particular SOC code or category has been provided also. The first volume of the Classification Structures for Career Information is subtitled "Occupational Statements."

The second volume is subtitled "Occupational Characteristics." This volume contains technical information about the individual occupations assigned to each SOC category. Each SOC category is identified along with all of its assigned DOT codes and other crosswalk codes. This second volume is divided into four parts.

A third volume also has been compiled. It is subtitled "Technical Information." This volume contains detailed explanations of the DOT occupational characteristics codes, a description of the various occupational and educational classification systems suggested uses for the entire publication, and a brief glossary of terms and a bibilography.

II. ORIENTATION TO THE CSCI

Orientation to the Standard Occupational Classification

Before proceeding with a detailed explanation of the tables contained in both the Occupational Statements volume and the Occupational Characteristics volume, a brief review of the SOC structure is in order. As explained in the "Background" section of this publication, the SOC is a four-level classification system. Beginning with the DIVISION, the least detailed and broadest category, the levels descend through the MAJOR GROUP and MINOR GROUP to the most specific level of detail, the UNIT GROUP. A SOC category that has DOT codes assigned to it is at the most specific level of detail.

Not every SOC level has DOT codes assigned to it. There are no DOT assignments made at the Division level. Within a Division, DOT assignments are made in a category when that category is at the finest level of detail. On a few occasions, there are DOT codes assigned to one of the Major Groups within a particular Division and, in this instance, there are no further levels--Minor Groups or Unit Groups--below this particular Major Group. Again, this is because this Major Group is at the most specific level of detail.

As stated, the 1980 SOC is a four-level taxonomy. There are SOC codes assigned to the various Major Groups, Minor Groups and Unit Groups. The Division is not coded. An example of this is:

Division.......	(No Code)	Social Scientists, Social Workers, Religious Workers and Lawyers
Major Group........	19	Social Scientists and Urban Planners
Minor Group........	191	Social Scientists
Unit Group.........	1912	Economist
	1913	Historians
	1914	Political Scientists
	1915	Psychologists
	1916	Sociologists
	1919	Social Scientists, Not Elsewhere Classified.

In this example, DOT codes are assigned to the Unit Groups because they are the finest level of detail. Because most occupational groups are broken down to this level of detail, DOT titles are most frequently assigned to the Unit Group level.

By contrast, however, SOC code 192, "Urban and Regional Planners," is and example of a 3-digit category being the finest level of detail. Thus, DOT codes are assigned to the Minor Group in this case.

The SOC code structure also leaves numerical gaps. For example, a numerical gap exists between Unit Group 1916 and the next group, 1919. The purpose of these gaps is to provide room for future expansion or revisions to the coding structure.

With this background, it can be seen that there would be a problem in using the SOC code structure (as it is published) with a computer assisted CIDS. One of the problems stems from the uncoded Divisions. To resolve this problem, a four-digit code was assigned to each Division to permit the Division category to be used for career information searching purposes. Unfortunately this code is out of numeric sequence with the other categories contained within the Division.

For instance, in the example previously given, the Division, "Social Scientists, Social Workers, Religious Workers and Lawyers," is coded 1899 while the rest of the Division categories (Major Groups, Minor Groups and Unit Groups) all begin with 19. This numbering system works for use in a computer search strategy. An explanation of how this coding was accomplished and how it can be used for CIDS purposes in the Technical Information Volume of the Classification Structures for Career Information.

Organization of the Occupational Statements

While primarily designed for counselor/client use, this volume contains information useful to people using the SOC to classify information obtained from surveys, preparing information for a CIDS, or for other technical purposes. The Occupational Statements contain a brief guidance-oriented definition for each of the 834 categories contained in the 1980 SOC. Each definition is identified with both the SOC title and its code.

In those cases where a SOC category has been assigned DOT codes and titles, additional information has been prepared. This information includes: Sample Work Activities, Hours of Work and Travel, and Sample Places of Work. Again it is important to note that unless there have been DOT codes and titles assigned, there will be only a SOC code, title, and the guidance-oriented definition. Additional occupational information was not developed unless DOT titles were directly assigned to a SOC category.

Organization of the Occupational Characteristics

The Occupational Characteristics Tables of the Classification Structures for Career Information contain technical information about the individual occupations assigned to each SOC category. This volume is designed primarily for technicians who prepare information for a CIDS. Other professionals working with occupational information may find this publication useful. The Occupational Characteristics volume contains only the guidance-oriented, descriptive statements listed in the other volume of the CSCI. Therefore its user may want to work with both volumes to obtain the full benefit of the comprehensive occupational information organized by SOC codes.

There is a table for each SOC category that has a DOT code assigned to it. Each table contains, in its heading, the SOC code title, the short guidance-oriented definition, and the number of assigned DOT titles. The rest of the table is divided into two parts, the Composite Classification Tables and a listing of DOT titles and related attribute codes.

The Composite Classification Tables provide the reader with an overview or summary of the characteristics associated with the DOT titles assigned to the SOC code. These tables are actually a series of charts. There are two kinds of information in these charts charts for each DOT characteristic. One type of information is the numerical frequency rate; the other type is the percent of times that a specific characteristic occurs within the entire group of DOT titles assigned to the SOC code.

The second part of this table contains a listing of each DOT code and title assigned to the particular SOC code. The various occupational characteristic codes, as well as other related occupational and educational classification codes, are displayed in this part of the table. Most of the headings for this part of the table have been abbreviated and double-stacked in the data columns to conserve space. The double-stacked columns of data contain two listings, one listed over the other. For instance, the Guide to Occupational Exploration (GOE) code for a particular DOT title is listed over the U.S. Office of Education vocational program code where appropriate. Complete explanations for each of the codes listed in these tables are provided in Volume III, Technical Information of the Classification Structures for Career Information.

III. Description of Tables in Volume II of the CSCI

The appendices in this volume provide a comprehensive explanation of the data referenced in the tables contained in Volume II, Occupational Characteristics. This section provides a brief description of these data for those already familiar with them but for whom the tables represent a different format for presenting this type of information.

On the next page, one table from Volume II is reproduced. It is marked with letters (A-D) and numbers (1-20). These letters and numbers reference the explanatory material which follows. Many of the explanations refer to the appropriate Appendix for additional information. These appendices will be especially useful to those unfamiliar with DOT worker trait and worker function coding and classification systems.

Overview of the Tables

Letters A-D illustrate how the tabes are divided. Each table has four parts; each part presents different information about the particular SOC group.

A. The part lettered "A" contains the SOC number and the SOC title. To the right side, this part also shows the number of DOT titles associated with the SOC group.

B. This part contains the guidance definition for the SOC group. This is the same definition which appears in Volume I.

C. This part contains the composite worker trait codes for the DOT titles associated with the SOC group. For each worker trait, the table presents the frequencey and percentage of occurrence across all DOT titles. As such, this part of the table provides an overview of worker traits within the SOC group.

D. This part contains the characteristic detail on each DOT title associated with the SOC group. It also contains summary information on the classification codes presented. As such, this part of the table is useful in understanding the SOC group at the occupational level.

Worker Traits and Classification Codes in the Tables

The numbers 1-20 are marked near each kind of information contained in the parts marked C and D. Numbers 7-12 and 15-20 contain worker trait information. Due to space limitations, the levels are indicated by codes taken from the Handbook for Analyzing Jobs. To facilitate use of the tables, the summary pages from the Handbook are reproduced following in Appendix G. This summary contains the definition for each level or attribute shown in the table.

CLASSIFICATION AND CODING DISTRIBUTIONS

5 Associated DOT Titles A

4123 REAL ESTATE SALES OCCUPATIONS

REAL ESTATE AGENTS and BROKERS assist clients in the buying or selling of a home or property. BROKERS not only sell real estate, but also rent and manage properties, make appraisals, and develop new building projects. They often arrange for loans and title searches for buyers and set up meetings between buyers and sellers. REAL ESTATE AGENTS are independent sales workers who work for a broker. They help buyers find homes or property and provide many of the services offered by the brokerage firm. B

```
                               CODING TABLES                   Total count =  5                C
----------------------------------------------      ------------------------------------------
PHY      S  L  M  H  V                               SVP   1  2  3  4  5  6  7  8  9  [18]
freq        5                                        freq              3     2
%         100                        [15]            %                60    40
                                                     ------------------------------------------
                                                     ENV   I  O  B  2  3  4  5  6  7  [19]
PHY      2  3  4  5   6                              freq  3     2
freq     1  1  1  5   4                              %    60    40
%       20 20 20 100 80                              ------------------------------------------
----------------------------------------------       APT    G  V  N  S  P  Q  K  F  M  E  C
TEMP     D  F  I  J   M  P   R  S  T  V                                frequency
freq     1     4  5      5            1  [16]        range 1
%       20    80 100    100          20                    2  4  4  2  1  1  1
----------------------------------------------             3  1  1  3  3  2  4
            attributes                                     4           1  2     5  5  5     1 [20]
   GED   1  2  3  4  5  6  7  freq                         5                             5  4
 R freq             3  2        = 5                                    percent
   %               60 40                             range 1
 M freq       1  2  2           = 5   [17]                 2 80 80 40 20 20 20
   %         20 40 40                                      3 20 20 60 60 40 80
 L freq             4  1        = 5                        4          20 40   100 100 100    20
   %               80 20                                   5                             100 80
----------------------------------------------       ------------------------------------------
 [1]      [2]               [3]                  [4]  OES Survey  [5]GOE        [7]GED [9]Aptitudes     [11]Phy. Dem  D
 Unique   DOT               DOT                       over            over         over     over             over
 Code     Code              Title                     OES Matrix  [6]USOE       [8]SVP [10]Temperaments [12]Env. Cond

41230205 191267010  Appraiser, real estate            (  1)25527     (  1)110603   544    22234244455      L2345
                                                      (  1)10243816  (  3)04170000 7      VPJ              B

41230208 250157010  Superintendent, sales.            (  3)71008     (  4)080204   545    22222344454      L56
                                                      (  3)30001403  (  2)BLANK    7      DIJP             B

41230211 250357010  Building consultant               (  1)79000     (  4)080204   434    22333344455      L56
                                                      (  1)30001899  (  3)04170000 5      IJP              I

41230214 250357014  Leasing agent, residence          (  3)71008     (  4)080204   424    33344344455      L56
                                                      (  3)30001403  (  2)BLANK    5      IJP              I

41230217 250357018  Sales agent, real estate          (  3)71008     (  4)080204   434    22333344455      L56
                                                      (  3)30001403  (  3)04170000 5      IJP              I

                                                       [13]           [14]
```

1. This column in the table contains a unique 8-digit code matching each DOT title associated with the SOC group. It is made up from the SOC code (1st four digits) followed by an ascending number sequence of four digits (0205, 0208, 0211, 0215, etc.). The principal use of this code is for information specialists.

2. This column contains the DOT code for the associated DOT title. The middle three digits of each DOT title contains the worker function rating for the occupations. The first three digits show the industry code.

3. This column shows the complete DOT title associated with the SOC group. Over 12,000 titles are represented in the 632 SOC groups in Volume II.

4. This column contains the OES Survey Codes and the OES Survey Matrix Code for each associated Dot title. The word "over" used in the table should not be interpreted mathematically; it simply indicates that one type of information is presented on top of the other. OES refers to the Occupational Employment Survey carried out under the auspices of the Department of Labor. A complete explanation of the OES is contained in Appendix C.

5. The GOE code in this column is the numeric code assigned to each DOT title in the Guide for Occupational Exploration, a Department of Labor, Employment Service publication. An index to these codes is contained in Appendix E.

6. The USOE code which appears below the GOE code in this column represents the program assignment to the United States Office of Education classification. The program codes are those used in Handbook VI (Appendix D). In some cases, the word "Blank" appears in this location. It indicates that there is not a program designated for the partcular DOT title.

7-12. These columns contain the worker trait assignments for the DOT titles. The summary of the worker traits following this section provides the correct interpretation for this data. The order of presentation is often important. For example, under GED, General Education Development, three numbers appear for each DOT title. These numbers designate the assigned developmental level in R (reading), M (mathematics), and L (language). The composite tables in part C show the order in which the information appears for each worker trait. SVP refers to Specific Vocational Development; Phy. Dem. refers to Physical Demands; and Env. Cond. refers to Environmental Conditions.

13-14. These columns contain the frequency of occurence of the indicated classification code in the SOC group. For example, OES Survey Code 25527 occurs once assigned to unique occupation code 41230205; OES Survey Code 71008 occurs three times assigned to 41230208, 41230214 and 41230217.

15-20. These data show the frequency and occurence of each worker trait within the SOC group. The abbreviated designations can be read as follows: PHY= Physical Demands; TEMP=Temperaments; GED=General Educational Development; SVP=Specific Vocational Preparation; ENV=Environmental Conditions; APT= Aptitudes. The meaning for each of the level designations is shown in the summary of worker traits in Appendix G. Two examples of correct interpretation of these data for SOC 4123 follow: the composite SVP for SOC 4123 is 3 titles (60 percent) assigned to level 5, and 2 titles (40 percent) assigned to level 7; the composite S (special) apptitude level for SOC 4123 is 1 title (20 percent) assigned to level 2, 3 titles (60 percent) assigned to level 3, and 1 title (20 percent) assigned to level 4.

IV. USE OF THE CSCI IN CAREER INFORMATION DELIVERY SYSTEM (CIDS) DEVELOPMENT

Overview

Section I describes the rationale behind the NOICC requirement for the use of the Standard Occupational Classification in CIDS development. The translation of this rationale into rules regarding appropriate action by a CIDS has proceeded slowly. Caution has been exercised to ensure the rules would cover only essential elements which are important to the realization of the intended objectives. The danger of over-regulation was perceived to be the potential inhibition of creative action by a CIDS to meet unique state needs.

Appendix A (NOICC Administrative Memorandum 81-23) contains the most current statement by NOICC on SOC implementation. Although this memorandum will be superceeded by more current statements, it is included to provide a sense of NOICC's general strategy. This strategy can be summerized as follows:

1. The Standard Occupational Classification structure and codes must be preserved in development of a career delivery system to ensure efficiency, comparability, and transportability.

2. Within these parameters, neither specific definitions nor specific aggregation or disaggregation of titles are mandated. Rather, NOICC requires careful documentation of a CIDS' actions in regard to title selection and coverage.

3. NOICC will make available resources which can be used, in whole or in part, to facilitate implementation.

Volumes I, II, and III were developed under NOICC funding to serve as the principal resource for CIDS developers.

Using SOC in Title Selection and Content Development

Within the parameters defined by NOICC, SOC is a useful tool in CIDS developmental activities. This uselfulness stems from certain attributes of the classification system.

1. SOC is inclusive of most work activities in U.S. society.

2. SOC combines most DOT titles into functionally related groups.

3. SOC clusters the occupational groups into a meaningful, work-related structure.

The SOC clustering of titles allows the CIDS developer to present a coherent picture of the world of work. Titles which are similar, at least on the dimension of function, can be displayed together. Further, the structure can provide a useful access strategy. CIDS' users find the SOC divisions to be a useable delineation of the world of work.

The attributes of SOC are also useful in selection of occupational titles for development. Because SOC is inclusive, it allows the CIDS developer to select titles based upon the extent of coverage within a division, interest of users in a division, or employment in the division. The inclusiveness of SOC can be a mechanism to facilitate user input.
For example, when provided with the overall SOC framework and a list of current titles covered by the CIDS, a user can easily indicate preferences for new titles to be selected for development.

There are a variety of ways to select titles for inclusion in a CIDS: availability of quality data, actual employment, employment potential, etc. However, CIDS, regardless of funding source, must ultimately satisfy the end user. Those operating a CIDS will recognize typical user demands in the following statements.

1. Individuals in the early phase of career decision-making want general information on a wide variety of occupational titles. Preferably, they wish to begin their career search with all options available for consideration.

2. Later, after beginning specialized training or after narrowing their options, individuals want information on specific occupational titles within an occupational group.

Together, these "demands" represent a critical concern for CIDS management which impact both marketing success and product development: users demand more information on more titles. Implicit in SOC is a developmental framework which can guide a CIDS in responding to such user demands. As mentioned earlier, certain attributes of SOC facilitate controlled planning of title development and user input into the planning process. Use of SOC as a mechanism to channel user input is essential both to ward off potential impatience in the speed of development and to provide a viable, contextual framework for input. Because of the DOT assignments to SOC, staff or users can easily disaggregate occupations within a group based on interest, employment potential, or data availability.

In addition to these benefits accruing to a CIDS using SOC, the information contained in Volume I, Occupational Statements, provides an inexpensive way to enhance a system. Historically, most state CIDS have selected titles for their occupational files based principally upon employment within their state and data availablility. Standards of information development demand rigorous collection procedures to fill all "slots" for each type of data for each occupational title presented. Unfortunately, this very desirable quest for excellence has lead to a most undesirable correlation: unless all slots can be filled, present nothing about the title. In other words, some CIDS developers will avoid a title such as "athlete" because of the absence of valid data on some important occupational characteristics.

Clearly, a CIDS should not "make-up" information about an occupation when valid data do not exist. However, the information in this Volume I provides national descriptions covering numerous titles. Such information can be included in a CIDS within the context of appropriate precautions for the user. Certainly valid, national descriptive information is better than no information at all.

Title selection for a CIDS can be conceptualized as a developmental process. Each title, taken alone, is presented with all valid information available. Further development, then, takes the form of aggregation or disaggregation based on the condiderations enunciated earlier and upon the guidelines contained in the NOICC memorandum. The result is a product with a built-in planning sequence for information development that provides maximum responsiveness to the needs of many diverse user populations.

Volume II of the Classification Structures for Career Information should prove to be a valuable resource to facilitate title selection. The assignment of DOT titles within SOC groups displayed in the tables could reasonably serve as guidelines for meaningful aggregation or disaggregation. Additionally, the data showing worker trait coding and classification assignment by DOT title could serve as a valuable resource in the process.

Occupational Coding

In developing a CIDS based upon SOC, occupational coding to an accessing strategy may pose a difficult problem. To address this problem in depth, it is essential to define the terms "accessing strategy" and "coding". These definitions will ensure a common understanding by readers.

For the purpose of this publication, an accessing strategy is defined as a method developed by a CIDS to be used by an individual for the purpose of reducing the full spectrum of occupational titles in the system to a manageable number. Typically, the purpose of an accessing strategy is to help a user identify specific titles which might be of interest. The method can be complex or straight forward. A complex method might, for example, help the user relate needs, aspirations, or values to occupational titles which might satisfy them. A straight forward method might be using the SOC numeric framework and titles to focus on a group of occupations which the user feels might be interesting.

Coding can be defined as the rules used by an information developer to relate a particular title to a specific attribute. Generally, the relationship will be expressed in "yes-no" terms, that is, an attribute will be defined to exist or not to exist within the occupation. Rules for coding can be clear-cut, for example, coding occupational titles to salary ranges using the average wage reported in the description; or rules for coding can be very judgmental, for example, coding occupational titles to interest in a high school subject where the developer must decide whether interest in the subject might be related to interest in the occupation.

Most sophisticated accessing strategies consist of numerous attributes grouped in the form of statements requiring a forced choice response by the user.

For example, a statement might be:

I would like an occupation which is related to my interest in:

a) math
b) social studies
c) language

To code all occupations in the system to the attributes (interest in math, social studies, and/or language) contained in the statement, the developer will have to decide, for each occupation, whether the occupation will be "liked" by a person "interested" in the subject. Sophisticated coding rules can be used with this type of attribute (such as multiple raters). However, it should be apparent that such attribute coding and the resultant accessing strategy does not and cannot approach 100% predictive validity.

As a consequence, it should be equally apparent that accessing strategies cannot provide users with final career choices. At best, accessing strategies direct a user to occupations which can be examined in greater detail. Further, the process inherent in the accessing strategy should expand options to be examined beyond an initial listing of occupations which satisfy the profile of choices the user has made.

With a sophisticated accessing strategy, the SOC numeric framework provides an ideal vehicle to expand options. Depending on the level of the occupation (unit group, minor group, etc.) produced by a search, functionally related titles can be generated by the system.

Volume II, Occupational Characteristics, provides the CIDS information developer with a wide range of variables useable in construction of questions or statements for inclusion in a sophisticated accessing strategy. An explanation of the tables in Volume II is provided in the previous section. Understanding the contents of these tables should not be difficult.

Nevertheless, the developer must be extremely careful in using the data in the construction of the questions or statements presented to the user and in coding occupations to response options.

Appendices F-K contain material dealing with worker trait and worker function data. This material, from the Handbook for Analyzing Jobs, is reprinted in the CSCI primarily as an aid to developers, since for many, the Handbook is difficult to obtain. The Handbook contains the rater instructions provided job development specialists. It is included to give the CIDS information developer a clear idea of the meaning of the ratings reported in the tables in Volume II. Without studying this material carefully, it would be quite easy to develop a question or statement which could potentially mislead the user. For example, in constructing a sophisticated accessing strategy, the developer may wish to include a question or statement on the decision-making requirements of occupations. Several worker traits within the category, temperaments, deal with this topic directly or indirectly: D-DCP, J-SJC, M-MVE. The careless developer might use J-SIC and M-MVC to code occupations to the following true/false question reflecting decision-making:

> I would like an occupation which requires me to be responsible for choices I make.

In a sophisticated accessing strategy, this question would be very appropriate to tap users needs for self-direction in an occupational selection. However, using the temperament variables M-MVC and J-SJC to code occupations to this question would be most inappropriate.

In Appendix G, abbreviated definitions for the two temperaments are provided:

> J-SJC
> Adaptability to making generalizations, evaluations, or decisions based on sensory or judgemental criteria.
>
> M-MVC
> Adaptability to making generalizations, evaluations, or decisions based on measurable or verifiable criteria.

These definitions combined with careful study of the rater instructions in Appendix J should lead the developer to reject J-SJC and M-MVC as viable data sources to code the questions. First, it is apparent that occupations could be assigned these temperaments due to the requirement in the occupation to make generalizations or evaluations, not decisions. Second, there does not seem to be a requirement that the individual assume responsibility for decisions made.

While careful study of these variables rules out their use in coding the question stated previously, it does suggest an alternative statement to replace it:

> I would prefer an occupation in which: (choose one)
>
> a) I would make judgments based upon subjective evidence
> b) I would make judgments based upon concrete evidence
> c) It doesn't matter to me

Clearly, the data in Volume II could be used to code occupations to this statement. Assuming an appropriate audience, the statement reflects the users needs for reality or subjectivity as the basis for judgmental behavior. These qualities are directly related to the decision-making style of individuals.

Virtually every worker trait contained in the tables will suggest similar accessing statements or questions to the creative developer. However, after carefully developing a question or statement, a second important task for the developer is deciding coding rules.

In the example presented above, J-SJC and M-MVC are to be used to code each SOC title to the statement. The most useful data for this purpose is contained in the composite section of the tables in Volume II. Looking up the data for several titles in Volume II, Part I illuminates the reason for clearly defined coding rules:

SOC 1131 Judicial, Public Safty, and Correction Administrators
J (SJC) = 9 (69%) M (MVC) = 5 (38%)

SOC 1341 Communications Operations Managers
J (SJC) = 7 (44%) M (MVC) = 6 (38%)

SOC 1414 Underwriters
J (SJC) = 1 (100%) M (MVC) = 1 (100%)

SOC 1624 Mining Engineers
J (SJC) = 2 (40%) M (MVC) = 5 (100%)

SOC 235 Special Education Teachers
J (SJC) = 4 (80%) M (MVC) = 0 (0%)

SOC 362 Clinical Laboratory Technologists and Technicians
J (SJC) = 0 (0%) M (MVC) = 7 (88%)

SOC 4364 Cashiers
J (SJC) = 0 (0%) M (MVC) = 3 (14%)

The percentage of DOT titles coded to these temperaments within these seven SOC groups varies from 0-100 percent. The developer will have to make a number of coding rule decisions:

1. Determine whether or not an occupational group should be coded to both options or only one. If only one, a rule will have to be decided to determine which variable gets priority.

2. A cut-off percentage must be determined as a decision point for indicating a SOC group has or does not have the attribute.

3. Should the percentage rule apply if the number of titles is very small, for example, one title in SOC 1414.

4. Can the developer exercise judgement in certain situations: for example, in SOC groups with few DOT titles, for SOC groups where the percentage is very close to the cut-off, etc.

Each of these decisions must be considered carefully. Probably the most useful excercise is to formulate a tentative set of rules, then apply it to a random selection of titles to see if it "works". Generally, this proceedure will lead to some rule modification and a decision to allow greater latitude for the developer to make judgments.

A final set of rules in the example above might be:

1. An occupational group can be coded as having one, both or neither of the traits.

2. Occupational groups which have over 50 percent of DOT titles assigned the trait should be coded as having it.

3. An occupational group must have more than four titles to be coded automatically. For those with four titles or less, the developer should make the final determination using the data assigned for DOT titles as a guide.

4. If a SOC group can be coded to neither trait, but the percentage assignment for each is between 30-50 percent, the developer should code the occupation to at least one trait based on DOT title data.

These rules would result in the following ratings for the seven SOC groups shown earlier.

	J-SJC	M-MVC
SOC 1131	X	
SOC 1341		X*
SOC 1414	X*	X*
SOC 1624		X
SOC 235	X	
SOC 362		X
SOC 4364		

* Developer's subjective decision

Following coding into the accessing strategy, users would receive the following list of titles depending on their choice of option a or b in the earlier statement:

I would prefer an occupationn in which: (choose one)

a) I would make judgments based upon subjective evidence.

Qualifying Titles:

SOC 1131, Judicial, Public Safety and Correction Administrators
SOC 1414, Underwriters
SOC 235, Special Education Teachers

b) I would make judgements based upon concrete evidence.

Qualifying Titles:

SOC 1341, Communications Operations Managers
SOC 1414, Underwriters
SOC 1624, Mining Engineers
SOC 362, Clinical Laboratory Technologists and Technicians

Of course, if the user selects option "c", "it doesn't matter to me" the system should be configured to maintain all titles as "qualifying."

This example illustrates a very intersting aspect in the development of accessing strategies and coding rules. The rules used in this example were "liberal"; conservative rules will yeild different results. Conservative rules (i.e., coding rules which will include only titles clearly having an attribute) would eliminate SOC 1131 from statement response (a) and SOC 1341 from statement response (b). In a sense, the result would be cleaner. However, in this writers opinion, accessing strategies should maximize qualifying titles for further exloration; thus, liberal coding rules are judged preferable.

In this brief description of accessing strategies and coding, the subject area has certainly not been exhaused. However, the comments and examples should be useful to experienced developers and will provide a proper orientation for beginners. Admittedly, the process is both art and science, as such, it is both challenging and exciting. Successfully developing an accessing tool used by hundreds of individuals is certainly adaquate gratification for the work invested.

Bureau of Labor Statistics

Assistant Secretary
Employment and Training Administration

Administrator
National Center for Education Statistics

Commissioner
Office of Education

NOICC
National Occupational Information Coordinating Committee

August 21, 1981

NOICC ADMINISTRATIVE MEMORANDUM 81-23

MEMORANDUM FOR: SOICC DIRECTORS

FROM: RUSSELL B. FLANDERS Russell B. Flanders
Executive Director, NOICC

SUBJECT: The Use of Classification Structure for Career Information

PURPOSE

The purpose of this memorandum is to (1) announce the official distribution of the Classification Structure For Career Information to be used as a technical standard for a State Career Information Delivery System (CIDS) and as the minimum content of the Occupational Characteristics component of the State Occupational Information System (OIS), (2) provide the SOICCs with new direction for the use of the Standard Occupational Classification (SOC) in a CIDS and certain aspects of the OIS, and (3) replace the previously issued NOICC Administrative Memorandum 80-23 (reissued as 81-9 in the SOICC Director's Guide), and supersede references to the SOC in other NOICC memorandums.

BACKGROUND

In March 1981, NOICC circulated a Draft copy of a proposed Administrative Memorandum addressing the use of the new guidance based definitions for the 1980 SOC prepared by the Wisconsin SOICC. Comments and suggestions for simplifying and clarifying the language in the draft memorandum were solicited from SOICC Directors having CIDS in their States. The comments received along with NOICC staff reviews have been incorporated in this memorandum.

Address all correspondence to Director:

Distributed with the draft memo were 282 preliminary SOC/CIDS definitions. Up to this time these have been referred to as either the "Wisconsin Project" or the "SOC/CIDS Definitions." Please note that NOICC has officially titled the completed product from the Wisconsin Project as "CLASSIFICATION STRUCTURE FOR CAREER INFORMATION (CSCI), Occupational Classification Systems FOR USE IN CAREER INFORMATION DELIVERY SYSTEMS." In a Memorandum dated July 30, 1981, NOICC announced the details for a workshop for the use of this new document.

The rest of this memorandum addresses the development of the CSCI document, and provides directions for using it to incorporate the SOC in a CIDS in accordance with NOICC's policy. Also, its use in the OIS is discussed.

To carry out the legislative mandates contained in P.L. 94-482 (the Education Amendments Act of 1976), and P.L. 95-524 (the Comprehensive Employment and Training Act Amendment of 1978), NOICC's Technical Steering Group (TSG) adopted a number of policies. Among them (as published in the Federal Register) is one which adopts the Standard Occupational Classification as NOICC's overall classification system.

This policy affects two of NOICC's major programs, the Basic Assistance Grants (BAG) program and the CIDS program. One of the primary purposes of the BAG program is to provide State Occupational Information Coordinating Committees with funds to develop and operate an OIS. The CIDS program is a competitive grants program in which grants have been awarded to States for the purpose of establishing computer systems and alternative modes for disseminating career information.

Although this memorandum is concerned primarily with the use of the SOC within the CIDS, there are some related OIS details that need to be addressed simultaneously.

An OIS is a process for organizing occupational information and a network for delivering that information to different user populations in appropriate formats and within requisite time frames. The occupational information is to support two types of user decisionmaking processes:

1. The planning process for education and training programs, and

2. The career planning, guidance, and job search processes.

An operational OIS contains a large data base that is derived from a variety of sources. As explained in Volume 2 of the OIS Handbook (page 2-1), this data base is organized according to commonalities of its source measures and maintained in the manner it is supplied to the OIS. The Handbook recommends that for each of the data categories, information be stored in the OIS at its finest level of detail. This practice allows for analytical flexibility to examine and compare different data interrelationships, and facilitates the aggregation of data from a variety of sources to prepare information in various formats and coding structures to serve a variety of users and uses.

Conceptually, the CIDS is one of the delivery mechanisms of an OIS. The primary purpose of the CIDS is to serve individuals (not agencies) who are seeking information to help in their career decision or job search processes. NOICC's policies for CIDS state that "The information used in these systems should be obtained from the OIS..." As compared to the OIS the CIDS does not have the multiplicity of uses (nor does it generate a variety of reports), therefore it does not require the information processing flexibility that was described as necessary for an OIS.

The CIDS data base, as derived from the OIS, can and should be organized and presented by a single format or classification structure for standardization and convenience purposes. This is one of the numerous reasons for NOICC's policy of adopting the SOC as the classification structure for the CIDS. In addition,the SOC has two other important features that make it suitable for this purpose: its structure and its compatibility with various data collection programs.

The SOC was designed to establish a standard coding system and nomenclature for use in identifying, classifying and codifying occupations. The structure of the SOC provides the CIDS with an organizing scheme that groups occupations with similar worker functions. This feature can be used to expand the occupational choice or options of the CIDS user. The feature also facilitates the development in the CIDS user of an understanding of the functional relationships among different occupations.

The SOC structure also permits an expansion of titles available within a CIDS. There are 842 separate SOC titles. Most of these are in turn directly related to groups of Dictionary of Occupational Titles (DOT). This means that the 842 SOC titles are matched with 12,099 defined base DOT codes. This arrangement enhances the selection of occupational titles appropriate for a particular State need.

As presented in the 1980 SOC Manual, the SOC structure is composed of a four-level system, i.e., Division, Major Group, Minor Group and Unit Group. Each SOC grouping or category represents a collection of occupations which are sufficiently similar in their main tasks be grouped under a common title. Fundamental to each SOC Division are the various categories arranged from general to a progressively more specific level of occupational detail. Because of this structure it is possible to aggregate or dissaggregate categories under a particular SOC Division according to the level of detail required.

Given the advantages of the SOC, the OIS/CIDS relationships, and the NOICC Policy, NOICC staff approached the implementation of the SOC Policy in a developmental way. It has proceeded with the SOC implementation with as much interagency and field input as possible. To assess the impact of a SOC/CIDS requirement i.e., "use the SOC as a standard structure for the presentation of occupational information in CIDSs funded under the CIDS Grant Program," NOICC held a meeting with a variety of CIDS experts. These included representatives from NOICC's statutory agencies, NOICC staff, non-profit and commercial organizations and the CIDS Assistance staff from the National Governor's Association.

The major conclusion of this group was that the SOC definitions were not suitable for use in a CIDS. Their review of the SOC indicated that more details about the workers functions were needed to facilitate their use in a CIDS.

The group advised NOICC that all CIDS would have the same problem. Therefore,they recommended that NOICC should sponsor a project to augment or convert the existing definitions for use in CIDS.

To avoid potential duplication of effort among the CIDS grantees and to fullfill another NOICC mandate, i.e., to establish standard definitions, NOICC initated a Special Purpose Grant with the Wisconsin SOICC. The end products of this project will be a publication and a computer tape. The publication entitled, Classification Structure For Career Information contains background information and a description of the development process used to prepare the SOC-based CIDS definitions and their accompanying profiles.

DESCRIPTION OF THE PRODUCT FROM THE WISCONSIN PROJECT: CLASSIFICATION STRUCTURE FOR CAREER INFORMATION

As explained in the previous section of this memorandum, the final product of the Wisconsin project will be in both printed and computer tape format. The basic effort of this project is the development of guidance based definitions for the 832 SOC codes and titles. Each definition will consist of four parts:

1. The SOC code and title and a maximum 540 character description. (This description is recommended by NOICC to be an integral part of the CIDS information).

2. Additional information including: sample work activities, hours of work/travel, and sample places of work.

3. A summary of the distribution of the DOT attributes. This information is displayed according to the percent and numerical frequency with which a particular attribute occurs within the total group of DOTs assigned to the SOC code.

4. A listing of all DOT codes, titles, and attributes, as well as other occupational classification code relationships assigned to a particular SOC.

As some SOC titles do not have DOT assignments, it is not possible to develop complete four part definitions for all titles. However, a written description has been prepared for all of the titles. This work was completed to facilitate the conversion of existing CIDS to the SOC and assist with any potential SOC category aggregation or dissaggregation needed for State purposes.

Another feature of the Classification Structure for Career Information is the assignment of some new codes to certain parts of the SOC. As published, the 1980 SOC Manual does not contain a code for the Division level titles and definitions. A code has been added to the Divisions to facilitate complete SOC useage within a computer version of a CIDS. Also, there may be some instances where a unique identifying code may be necessary to single out a particular DOT within a SOC category. For these purposes and for maintaining standardization, a unique code has been assigned to each DOT apportioned to each SOC group.

OCCUPATIONAL CHARACTERISTICS COMPONENT of the OIS.

"Occupational Characteristics" as defined in Volume 1, Chapter 4 of the OIS Handbook includes information about the worker, the work performed and the work environment for specific occupations. This information is of interest to two distinct types of OIS users. One group is composed of the planners and administrators of education and training programs, who are interested in information to help in program development, operation and evaluation. This group uses quantifiable Occupational Characteristics information in an analytical manner to: identify groupings of occupations for training purposes, assist in program participant recruitment, establish performance standards, and other administrative and management purposes.

The other group of Occupational Characteristics information users are professional career guidance and counseling personnel, as well as students and other clients of human services. The information this group tends to use is more descriptive in nature and less statistical than the previous group.

This descriptive information is used to assist individuals in the career decisionmaking and career exploration processes. In keeping with its policies relative to OIS and CIDS, NOICC encourages the information used for career exploration and decisionmaking purposes be obtained from the OIS and delivered to its users through the CIDS.

As described in Chapter 4, Volume 2 of the OIS Handbook, most of the information needed for CIDS purposes is to be located in the OIS Occupational Characteristics file. Much of the data identified as important to this file is contained on a computer tape being compiled as part of the Wisconsin project.

The codes used to represent the numerous DOT and Guide to Occupational Exploration (GOE) worker and occupational attributes are contained on this tape. Also included are: DOT, Standard Industrial Classification (SIC), and Occupational Employment Statistics (OES) codes and titles. All of these codes and titles, along with their attribute codes are arranged according to their relationship to the SOC codes, titles and definitions. The information contained on this tape still does not represent a complete occupational characteristics file for a State OIS. NOICC recognizes that there are a number of technical issues to be resolved at both State and Federal levels before this file can become as complete as defined in the Handbook. However, until such time as these issues are resolved, NOICC encourages the use of the file in a State OIS as a major component of its Occupational Characteristics file.

AVAILABLILITY OF WISCONSIN PRODUCTS

1. Computer Tape

It is expected that either a print or data management tape containing the SOC information previously described will be available by early September (1981) from the Wisconsin Vocational Studies Center. A NOICC Information Memorandum will be issued when all of the ordering details are available. For more information please contact David Caulum (608) 263-5601.

2. Classification Structure for Career Information

A limited number of preliminary draft copies of this publication will be made available to participants of the NOICC sponsored workshop to be held in Washington D.C. on September 16 and 17, 1981. (Details of this Workshop were mailed in a separate memorandum). Single copies of the official publication will be sent to SOICC Directors and other copies will be available pending the resolution of the current Federal Government printing moratorium.

GUIDING PRINCIPLES FOR IMPLEMENTATION OF SOC INTO CIDS

The SOC is to be used as the standard structure for the presentation of occupational information in systems funded under the NOICC sponsored CIDS Grants Program. In addition to previously delineated rationale for the use of the SOC, there is a need to establish a degree of standardization and compatibility among State systems to facilitate the exchange of information among systems and the potential development of a National data file. Keeping this rationale in mind, and to provide the States with as much flexibility as possible, NOICC has developed the following "guiding principles" for using the SOC as the "Standard Structure" in a CIDS.

1. The hierarchical coding structure of the SOC must be maintained.

Maintaining the SOC structure should be interpreted to mean that within a SOC Division many aggegrations of units, minor and major groups can be created in accordance to the labor market organization of the State. Conversely, dissaggregations within a SOC Division can also be made, i.e., splitting a unit group into several subgroups may best reflect the labor market conditions of the State. (Further explanations and directions are given in the next two guiding principles.)

2. Combinations or aggregrations of major, minor and unit groups within a SOC Division may be created.

SOC Unit Groups and Minor Groups may be aggregated up to the next larger Group or disaggregated down to the next lower Group. The aggregation process does not permit the reassignment of specific DOTs to other SOC Unit, Minor, or Major Groups nor the reassignment of a SOC group to another SOC Division. Using the SOC Division, "Executive, Administrative and Managerial Occupations" as an example of aggregation, consider the following scenario:

> Because a particular State government does not have certain positions it is necessary to combine unit groups 1131, 1132 and 1134 but exclude unit groups 1133, 1135, and 1139. This aggregration can then be identified by the Minor groups code of 113 under the title of "Officials and Administrators, Government Agencies."

3. A disaggregation below the Unit Group of a single, or combination of, DOT codes (assigned to the Unit Group) may be created.

> For example, consider Minor Group 127 Manager; Social Sciences and Related Fields; this configuration of DOTs may merit combining the DOT titles of (1) Director, Fundraising (2) Director of Community organizations (3) Executive Director, Sheltered Workshop and (4) Director, Volunteer Services. The four remaining DOT codes may also be combined to form another sub-group under this Minor Group. In this example two of the unique eight digit codes should be assigned to the newly formed subgroups, and used instead of the Minor Group code (127).

As illustrated by the previously described examples, CIDS information developers have the flexibility to select any combination of major group, minor group, or unit group codes, titles and definitions. This flexibility provides for the selection of the appropriate level of occupational detail that best reflects the labor market structure of the State.

4. Records must be maintained relative to how each SOC group was aggregated or disaggregated.

This requirement is necessary not only for internal State information updating purposes, but also to facilitate the exchange of information among States. The record will also be needed for the future inclusion of a National Data File, and to use needed information obtained from the 1980 Census. The record of SOC modification can be an internal computer file (which can be "called up" for printing) or maintained manually as a hard copy.

A hard copy must be made available if requested by NOICC.

5. Identifying and selecting SOC codes or occupational sub-groups for inclusion in the CIDS is the State responsibility

While NOICC has not developed any specific instructions for this selection process, the following criteria may be used to determine SOC codes to be included:

- o Occupations contained in a SOC that have State employment;
- o Occupations contained in a SOC that have Job Bank listings;
- o A high level of client and/or user site interest in a particular occupation;
- o The frequency of requests for information about a particular occupation; and
- o Availability of the required national, State or local information concerning specific occupations.

ACTION REQUIRED

1. It is now time to initiate a SOC identification process for the selection for appropriate SOC codes and titles or complete any necessary aggregations or disaggregation to establish the appropriate level of occupational detail required for the State CIDS. Documentation of this work, i.e., aggregation/disaggregation must be maintained to insure that it is possible to trace back to the original SOC configration.
2. Take action to acquire the SOC/CIDS computer tape from Wisconsin.
3. Develop the plan for incorporation of SOC based information into your Statewide CIDS use.
4. Implement plans to incorporate the SOC in the CIDS. Use the Classification Structure for Career Information as a primary resource document for SOC/CIDS related activities.
5. File this Administrative Memorandum in your SOICC Director's Guide.

INQUIRIES

Any inquiries regarding this memorandum should be directed to John Van Zant or Walton E. Webb on (202) 653-7680.

STANDARD OCCUPATIONAL CLASSIFICATION (SOC) SYSTEM

Background

The Standard Occupational Classification provides a mechanism for cross-referencing and aggregating occupation-related data collected by social and economic statistic reporting programs. The system is designed to maximize the analytical utility of statistics on labor force, employment, income and other occupational data collected for a variety of purposes by various agencies of the United States Government, State agencies, professional associations, labor unions and private research organizations.

The classification covers all occupations in which work is performed for pay or profit, including work performed in family-operated enterprises where direct remuneration may not be made to family members. This classification may be used to classify volunteers, but occupations unique to volunteer settings were not included in this edition. The SOC provides a coding system and nomenclature for identifying and classifying occupations within a framework suitable for use in and out of government.

In developing this classification, the following principles were followed:

1. The classification should realistically reflect the current occupational structure of the United States.
2. An occupation should be classified on the basis of work performed. Skill level, training, education, licensing and credential requirements usually associated with job performance should be considered only when an inaccurate picture of the occupational structure would be presented without such consideration.

3. Place of work (industry) should be considered in classifying an occupation only when the work setting alters the nature of the work sufficiently to warrant separate classification. For example, cooks in private households and commercial settings were classified in different unit groups because the nature of the work is significantly dissimilar in the two work settings.

4. The occupations should be classified in homogeneous groups that can be defined so that the content of each group is well delineated.

5. An occupation that combines two distinct activities should be classified in one group on the basis of the primary activity, the one that accounts for the major portion of the worker's time. However, in cases where one activity requires special skills that are crucial in carrying out the duties of the occupation (although not required for as much time as other activities), the activity should determine the classification of the occupation.

6. Each occupation should be assigned to only one group at the lowest level of the classification system (unit group).

7. Large size should not by itself be considered sufficient reason for separate identification of a group.

8. Small size should not be considered sufficient reason for excluding a group from separate identification, although size must be considered or the system could become too large to be useful.

9. Supervisors should be identified separately from the workers they supervise wherever possible in keeping with the real structure of the world of work.

10. Apprentices and trainees should be classified with the occupations for which training is being taken.

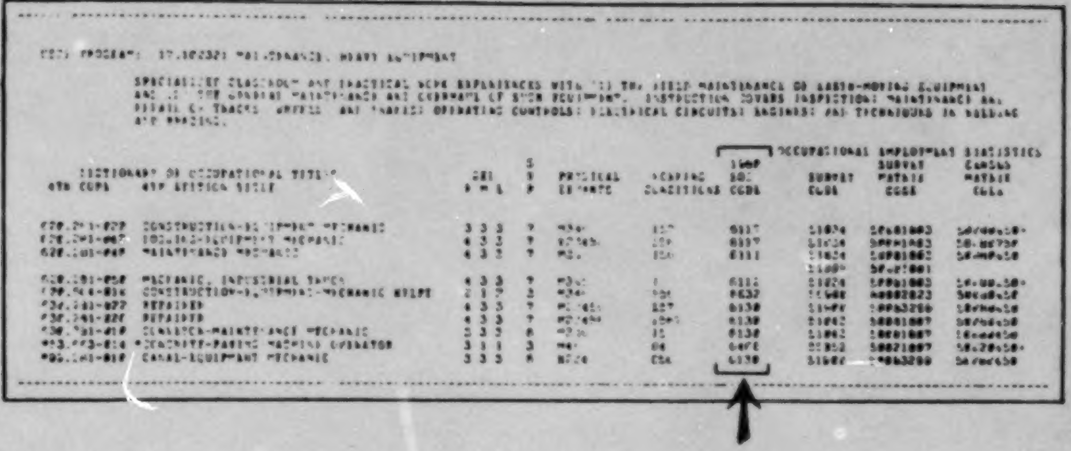
11. Helpers should be identified separately when their work is such that they are not in training for the occupation for which they are providing help or if their work is truly different.

12. The need for comparability to International Standard Classification of Occupations should not be an overriding factor.[34]

---

[34] U.S. Department of Commerce, Office of Federal Statistical Policy and Standards, Standard Occupational Classification Manual (U.S. Government Printing Office, Washington, October 1980), pp. 8-9.

STANDARD OCCUPATIONAL CLASSIFICATION CODE



The SOC is structured on a four-level system: division, major group, minor group, and unit group. Each level represents groupings in successively finer detail which enables users to tabulate or analyze data on different levels of aggregation. Residual categories are established, where necessary, at all levels to handle groups of occupations that do not warrant separate identification or do not fit into one of the specific groups. (See Reference D for a listing of SOC codes and associated titles.)

STANDARD OCCUPATIONAL CLASSIFICATION MANUAL

6117 Heavy Equipment Mechanics

This unit group includes occupations involving repairing and maintaining the operating condition of mobile mechanical, hydraulic, and pneumatic equipment used in construction, logging, mining, etc. and of railroad rolling stock. Engine mechanics are classified by appropriate propulsion system in unit groups 6111, 6112, 6113, and 6114.

Construction-equipment mechanic	271	620261022
Logging-equipment mechanic	544	620281042
Mechanic, endless track vehicle	154	620381014
Mechanical-unit repairer	154-542	620381018
Car repairer	542	622381014
Car repairer, pullman	751	622381018
Car-repairer apprentice	542	622381022
Mine-car repairer	578	622381030
Air-compressor mechanic	542	622684010
Flatcar whacker	817	807667010

Each group includes a listing of Dictionary of Occupational Titles (DOT), Fourth Edition, codes and titles which are descriptive of the group. Each title is assigned to one group and only to one group. All DOT base titles are included in the classification. Immediately following the title there may be a Roman numeral, e.g., I, II, III; these numbers indicate that there is more than one occupation with the same title and industry designation. The first column of numbers, where there are two columns of numbers, is the code for the industry designation that is used in the DOT to designate the "kind of industry or industries" where the job is found. One to four sets of three-digit numbers may be assigned to the title. When an occupation is found in a large number of industries, a cross-industry designation, e.g., clerical, professional and kindred, is assigned to the occupation. The last column contains the nine-digit code associated with the title. These occupational titles and codes and industry codes are explained in the Dictionary of Occupational Titles, Fourth Edition, and on pages 41 through 47 of this publication.

Selected occupational codes from the 1970 Census of Population Classified Index of Industries and Occupations also are included in the groups. The Census codes which are the single three-digit number in a column near the center of the page, were added to provide additional information about the content of these groups.

Data Uses, Limitations & Issues

Federal government agencies will be required to use the SOC wherever it is appropriate for collecting occupational data, planning occupational education and training programs, identifying areas of occupational research and analysis, planning and placement services, studying the mobility of workers and related activities dealing with occupational statistics. State and local government, business and labor organizations and research groups are encouraged to use it for statistical purposes. Where the SOC detail is not sufficient for a specific use, subclasses should be developed that are compatible. Where conceptual compatibility cannot be maintained without causing program difficulties, cross references should be made to the extent feasible.

New or unique occupations that are not described or listed in the SOC should be classified in the group to which they are most similar.

The system allows the tabulation of data from different data unit groups for special purposes. For example, college and university teachers are classified by subject matter taught, which allows teachers to be combined with subject matter specialists, i.e., college chemistry teachers and chemists.

Publication formats of occupational data should follow this structure for major tabular presentations but recombinations such as those mentioned above are encouraged for supplemental analysis.

For some presentations, especially of cross-tabulation data, a very abbreviated set of occupational classes may be needed. In order to provide for standardization of such abbreviated or aggregated groups, the following groupings are suggested:

1. Administrative, engineering, scientific, teaching and related occupations including creative artists (Major Groups 10-34);
2. Technical, clerical, sales and related occupations (Major Groups 36-48);
3. Service occupations, including military occupations (Major Groups 50-53 and 91);
4. Farming, forestry, fishing and hunting occupations (Major Groups 55-58);
5. Precision production, crafts and repair (Major Groups 60-69);
6. Operators, fabricators and laborers (Major Groups 71-87).

OCCUPATIONAL EMPLOYMENT STATISTICS (OES) PROGRAM

Background

The Occupational Employment Statistics (OES) program is a Federal-State cooperative program designed to produce national, State and area data on current and projected occupational employment for use in planning vocational education and training programs and in career guidance. It provides a consistent conceptual and methodological approach to the development of State and local data by the State Employment Security agencies in cooperation with the Bureau of Labor Statistics and the Employment and Training Administration. The Bureau of Labor Statistics develops the national OES data. The OES program has been adopted by NOICC as the standard principal source of current and projected occupational employment data for use in an occupational information system.

In general, information on current occupational employment is based on a direct survey of employers, the OES survey and on a current industry-occupational matrix derived from the OES survey. In States where the survey data are not available, the matrix is based on data updated from the 1970 Census of Population.

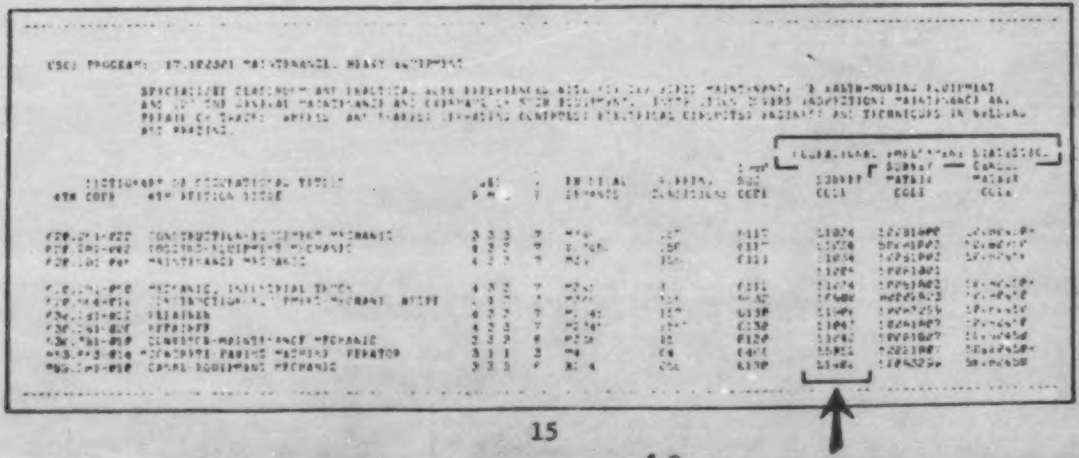
The OES Survey

The OES survey collects data on current employment by occupation and industry for non-farm wage and salary workers. The survey is a Federal-State cooperative program begun in 1970; in Fiscal Year 1981, the District of Columbia and all States except California are conducting the survey. The survey provides data for approximately 1,700 occupations by detailed industry category for the nation, States and a limited number of Standard Metropolitan Statistical Areas.

The OES survey operates on a three-year cycle with each year's survey covering a different sector of the economy. For example, the OES survey occupations shown in this edition of the VPO are from the 1974 survey of manufacturing industries; the 1975 survey of government, hospitals and most non-manufacturing industries except trade, transportation, communications and public utilities and the 1976 survey of wholesale and retail trade, transportation, communications and public utilities. The OES survey does not cover the agriculture, forestry and fishing industries or self-employed, unpaid family and private household workers. Data on these industries and workers normally come from the Census of Population; however, research is being conducted on expanding the OES survey into the agriculture, forestry and fishing industries.

The OES survey uses a questionnaire containing a list of occupations specially designed for each industry or for a group of industries being surveyed that, in general, employ the same kinds of occupations in all categories, e.g., professional, clerical, etc. Typically, the survey collects data for a specific reference week in the spring of the year. Questionnaires are mailed to a randomly selected sample of employers. Telephone follow-ups and personal interviews are conducted with those employers whose responses are considered critical. The sample of employers is distributed (stratified) according to the employer's industry and level of employment; all large employers are included in this sample. Estimates of current occupational employment are generally produced for industry and employment size categories similar to those used in the sample. These estimates are then adjusted to the level of total employment in the State or area being surveyed.

OES SURVEY OCCUPATIONAL CLASSIFICATION



Each occupational category in the OES survey is assigned a unique title, definition and five-digit code. The five-digit coding system for the OES survey occupational categories is structured into major and minor groups. Since a major purpose of the OES survey is to provide data for use in the industry-occupation matrix system which is supplemented by Census information, the OES major groups were designed to be compatible with the 1970 Census occupational groups. The major and minor groups to which an occupation belongs is represented in the first, second and sometimes the third digits of the code. The first digit identifies the major group, i.e., 10000 is Managers and Officers, 20000 is Professional Workers, etc. The second and third digits identify intermediate and minor groups, i.e., 22000 is Natural and Mathematical Scientists and 22100 is Mathematical Scientists. A full list of the major and minor group codes is presented below; a full list of the OES survey occupation codes and titles utilized in this publication is shown in Reference E.

Summary of OES Survey Occupational Groups Coding Structure

- 10000 Managers and Officers
  - (19000 All Other Managers and Officers)
- 20000 Professional Workers
  - 21000 Engineers
    - (21900 All Other Engineers)
  - 22000 Natural and Mathematical Scientists
    - 22100 Mathematical Scientists
      - (22199 All Other Mathematical Scientists)
    - 22200 Physical Scientists
      - (22299 All Other Physical Scientists)
    - 22300 Life Scientists
      - (22399 All Other Life Scientists)
  - 23000 Social Scientists
    - (23900 All Other Social Scientists)
  - 24000 Systems Analysts
  - 25000 Other Professionals
    - 25100 Teachers
      - (25199 All Other Teachers)
    - 25200 Photographers
      - (25299 All Other Photographers)
    - 25300 to 25500 Miscellaneous Other Professionals
  - (29000 All Other Professional Workers)

30000 Technicians

31000 Computer Programmers
32000 Engineering Technicians
(32900 All Other Engineering Technicians)
33000 Science Technicians
(33900 All Other Science Technicians)
34000 Other Technicians
35000 Medical and Dental Technologists and Technicians
(All Other Medical and Dental Technologists and Technicians)

(39000 All Other Technicians)

40000 Service Workers

41000 Janitors, Porters and Cleaners
42000 Guards and Doorkeepers
(42900 All Other Guards and Doorkeepers)
43000 Food Service Workers
(43900 All Other Food Service Workers)
44000 Other Service Workers

44500 Police/Fire Related Workers

(49000 All Other Service Workers)

50000 Production, Maintenance, Construction, Repair, Material Handling and Powerplant Workers

51000 Mechanics and Repairers
(51900 All Other Mechanics and Repairers)
52000 Darkroom Workers
(52900 All Other Darkroom Workers)
53000 Laundry and Drycleaning Occupations
54000 Truck Drivers
55000, 57000 and 58000 Other Production, Maintenance, Construction, Repair, Material Handling and Powerplant Workers
55U00 Assembler
(55U99 All Other Assemblers)
*Note: The code 55E22 has been used previously for Assemblers
56000 Helper, Trades
*Note: The code 55B87 is used for Helper, Trades when a detailed breakout of Helpers is not used.

(59001 All Other Skilled Craft and Kindred Workers)
(59002 All Other Operatives and Semiskilled Workers)
(59003 All Other Laborers and Unskilled Workers)

60000 Clerical Occupations

61000 Office Clerical Occupations

61100 Office Machine Operators
(61199 All Other Office Machine Operators)
61200 to 61400 Other Office Clerical Occupations

(61900 All Other Office Clerical Workers)

62000 Plant Clerical Occupations
(62900 All Other Plant Clerical Workers)

70000 Sales Occupations

71000 Sales Representatives
(71900 All Other Sales Agents, Sales Associates, and/or Sales Representatives)
72000 Sales Clerks and Other Sales Related Occupations

(79000 All Other Sales Workers)

RESIDUAL CATEGORIES are shown in parentheses. The appropriate residual for categories, where no residual is shown, is the primary group residual category. For example: The appropriate residual category for codes within the 34 group, Other Technicians, is 39000, All Other Technicians.

Before each year's survey, the occupational categories and questionnaires are reviewed and updated as necessary. For this reason, the content of OES survey occupational categories changes from time to time as occupations are dropped or added. The OES survey codes, however, are unique and the scope (coverage) of employment and the related titles and definitions are fixed. New codes are assigned to any occupational category in which the scope of employment is considered to be significantly different from previously used codes. New definitions also are prepared.

The OES Survey Dictionary, available from the Bureau of Labor Statistics or cooperating State Employment Security agencies, is a compendium of all current OES survey occupational titles, definitions and codes. A revised OES Survey Dictionary is issued each year to include the most recent changes in the codes, titles and definitions. The Dictionary, dated 1976, shows the occupational categories included in this edition of the VPO. The occupations initially were developed primarily from the third edition of the Dictionary of Occupational Titles (DOT). The occupational categories have been updated and revised by survey experience and use of the fourth edition of the DOT (described in pages 41 through 47 of the VPO). Because the DOT was used in the development of the OES survey occupations, the survey occupations can be related to the nine-digit DOT codes.

Because the OES survey occupations shown in this edition of the VPO include only those occupational categories used in the 1974-1976 OES surveys, some codes shown may no longer be in use and, therefore, do not appear in the most recent OES Survey Dictionary or on current OES survey forms. Also, the most recent Dictionary and the survey forms include occupational categories added during the 1977-1980 survey rounds but are not found in this edition of the VPO. Reference F lists the OES survey codes that have been dropped or added since 1976.

Since the OES survey provides data on occupational employment by industry, it is possible to relate the OES survey occupational categories to the industry codes of the Standard Industrial Classification (SIC) Manual. The SIC classifies industries according to economic activities, i.e., agriculture; mining; construction; manufacturing; transportation; communication; electric and sanitary services; wholesale and retail trade; finance, insurance and real estate; personal, business, repair and other services; and public administration. The SIC provides a single industrial classification system for use in Federal statistical programs and by other users. The SIC is developed and issued by the Office of Federal Statistical Policy and Standards of the U.S. Department of Commerce (formerly the Statistical Policy Division, Office of Management and Budget).

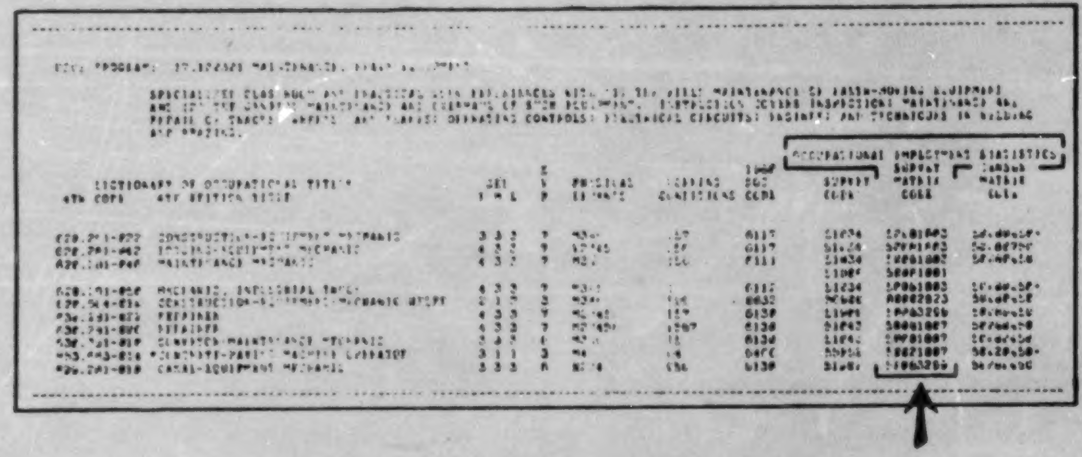
Reference E shows the three-digit SIC codes (two-digit for education) for industries in which data for each OES survey occupational category was collected. This reference contains codes from both the 1967 and 1972 editions of the SIC Manual, since each edition was used in the OES survey: the 1967 SIC was used to define the industries covered in the 1974 and 1975 OES survey and the 1972 SIC was used for the 1976 OES surveys. Codes from the 1967 SIC are indicated by an asterisk in Reference E. Reference I shows a list of the industry codes and titles now in the survey from both the 1967 and 1972 editions of the SIC.

Industry-Occupation Matrix System

The industry-occupation matrix is a tabulation of employment data cross-classified by industry and occupation. The data are arranged in the form of a grid or matrix which is divided into columns and rows. The columns of the matrix show the industries or employment and the rows show the occupations of employment. By reading down any column, the user can determine the distribution of employment by occupation within an industry. Similarly, by reading across any row, the user can determine the distribution of employment by occupation within an industry.

As mentioned earlier in this section, the industry-occupation matrix system of the Occupational Employment Statistics program consists of two types of matrices based on different sources of data: the OES survey-based matrix based on the OES survey data and the Census-based matrix based on 1970 Census of Population data. Each matrix has its own set of occupation codes and titles that are different in detail and content. In both matrices, however, the occupations are arranged in a structure similar to that of the 1970 Census occupational coding system.

SURVEY-BASED MATRIX SYSTEM



The survey-based matrix is developed from data collected through the OES survey described earlier plus supplemental data from the 1970 Census of

Population for industries and types of workers not covered by the OES survey. The process of matrix construction is complex because the OES survey does not collect data on every occupation in every industry. For example, the survey occupational category "Maintenance Electrician" is not included on all survey forms where small numbers are employed. In these industries, estimates are made by disaggregating the survey occupational categories of "Other Skilled Workers." The matrix developed in Fiscal Year 1979, based ~~on the~~ 1974-1976 OES survey, provides data on 1,574 occupations, a somewhat smaller number of occupations than found in the input survey data.

The survey-based matrix uses an eight-digit occupational coding structure with the occupations arranged into groups similar to those of the Census-based matrix system which was developed earlier and which was already familiar to many users of the matrix data. Each occupational category in the OES survey was assigned to a Census occupational group. Documents used.in making these decisions were the OES Survey Dictionary, the Dictionary of Occupational Titles (Third Edition) and the 1970 Census Classified and Alphabetical Indexes.

Because the Census occupational lists carry no definitions, the classifiers sometimes had difficulty deciding where an OES survey occupation should be classified. Sometimes the decision could be made based on the industries in which the occupation was surveyed and the industry or industries to which the Census related the occupation. If the survey title was not found in the Census lists, the survey occupation was classified into a Census group by judgment. Information on whether the job was apprenticeable also was used.

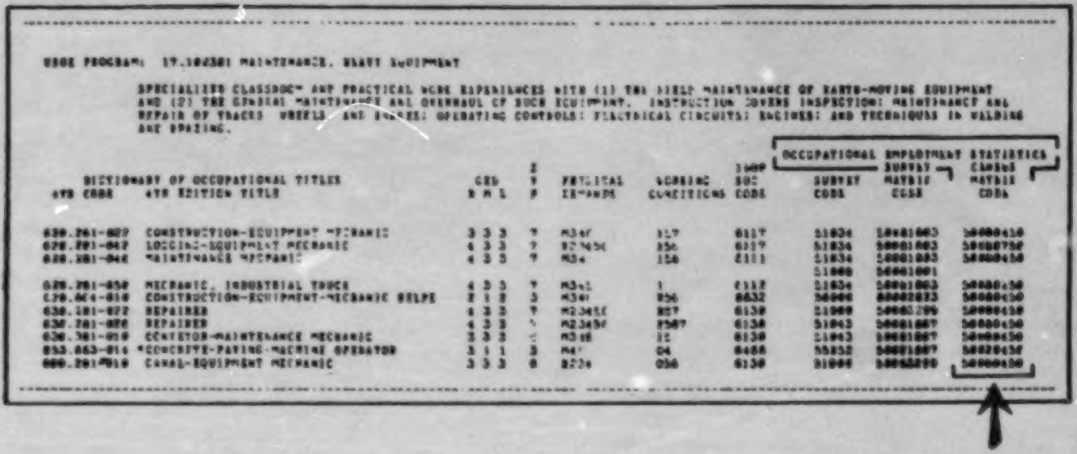
To aid in grouping the long lists of machine operatives surveyed, the survey-based matrix was designed to include 14 groups of machine operatives, 12 of which are industry-specific and 2 of which are not. In addition, there are three groups of more general operatives, grouped according to a broad type of industry--durable goods, nondurable goods and nonmanufacturing.

Once classified into the Census occupational groups, the 1,836 survey occupational categories were coded with unique eight-digit codes and grouped in a manner similar to that of the Census-based matrix. Although the sequence of the survey-based matrix occupational groups is the same as the Census-based matrix, the codes are not necessarily the same because the survey-based matrix has more summary level occupational categories. The first two digits of the survey-based matrix code indicate the broad occupational category, such as 10000000, Professional; 20000000 Managerial; or 70000000, Service. The third and fourth digits indicate subdivisions of the major group. Thus, 10020000 is Engineers, 10040000 is Life and Physical Scientists, and 10200000 is Teachers. The fifth and sixth digits indicate a specific Census occupational title or summary level title, such as 10200100, Adult Education Teachers; 10202000, College and University Teachers; or 10200300, Elementary School Teachers. The final two digits indicate the specific OES occupational category. Thus, 10202002 is Extension Service Specialists. The full list of survey-based-matrix occupational category titles and codes is shown in Reference G.

Because the survey-based matrix is based on the OES survey, the occupational codes and titles used in the matrix can be related to OES survey codes and titles, which in turn are related to the Dictionary of Occupational Titles codes. Reference G shows a conversion from survey-based matrix to OES survey codes, in order by matrix code. Reference E shows the matrix code related to each survey code in order by survey code.

As noted earlier, the matrix arrays data by occupation and industry. It is possible, therefore, to use the matrix to identify the industries in which each occupational category occurs and the number employed in that occupational category in each industry. The matrix uses a six-digit industry coding scheme, with the first two digits indicating the industry division and group-400000 is Manufacturing, 410000 is Durable Goods Manufacturing. The third, fourth and fifth digits correspond to the Standard Industrial Classification (SIC) code of the industry at the two- or three-digit level of the SIC--412400 is Lumber and Wood Products (SIC 24) and 412410 is Logging (SIC 241). The sixth digit of the matrix industry code is always a zero. The SIC codes embedded in the matrix industry codes are the same as those shown in Reference E.

CENSUS-BASED MATRIX SYSTEM



The Census-based industry occupational matrix generally follows the occupation and industry classification used in the 1970 Census of Population Alphabetical Index of Industries and Occupations or the 1970 Census of Population Classified Index of Industries and Occupations as described in the next section of the VPO. Certain adjustments were made to the Census major occupational group categories so that the present matrix categories would be consistent with those used in the earlier matrix based on 1960 Census data.

The major group of operatives, except transport and transport equipment operatives, were aggregated to the category operatives; farmers, farm managers, farm laborers and farm foremen were aggregated to the category farmers and farm workers; and service workers, except private household and private household workers, were aggregated to the category service workers. The remaining major occupational groups in the matrix are the same as those in the Census with only slight differences in the titles. These are professional, technical and kindred workers; managers, officers and proprietors; sales workers; clerical workers; crafts and kindred workers; and laborers, except farm.

The matrix intermediate occupational categories were developed independently of those in the Census but many of them are identical to the Census categories. There are 37 intermediate groups in the matrix versus 31 in the Census.

The matrix contains fewer detailed occupations (377) than are found in the Census (442) because certain Census occupations were aggregated to the matrix as follows:

1. The Census occupational category "personal service apprentices" is related to only two occupational categories, i.e., "barbers" and "hairdressers and cosmetologists" and was proportionately distributed between them in the matrix.
2. The individual college teaching specialties in the Census have been arranged to "college and university teachers" in the matrix.
3. All of the separate apprentice occupations in the Census have been combined in the matrix with their respective journeymen occupations.
4. The Census occupational categories "printing apprentices, except pressmen" and "craft apprentices, n.e.c.," could not feasibly be combined with any single journeymen occupation. Both were therefore added to "craft and kindred workers, n.e.c."
5. The following Census sales occupations, which are identified by industry were aggregated to "sales workers, n.e.c." in the matrix: sales representatives, manufacturing; sales representatives, wholesale trade; sales clerk, retail trade; salesmen, retail trade; and salesmen of services and construction.

The Census matrix structure is based on an eight-digit code that allows for aggregation of several levels. The first two digits identify the major occupational group--10000000 is Professional, Technical and Kindred Workers. The third and fourth digits identify the intermediate occupational group-10020050 is Engineers, Technical. Finally, the last four digits identify the detailed occupation--10020050 is Engineers, Aero-Astronautic. The total of all occupations (code 00000000) is derived by aggregating all the major occupational groups. The full list of Census-based matrix occupational titles and codes along with the related 1970 Census codes and titles is shown in Reference H.

UNITED STATES OFFICE OF EDUCATION (USOE) CLASSIFICATION SYSTEM

Background

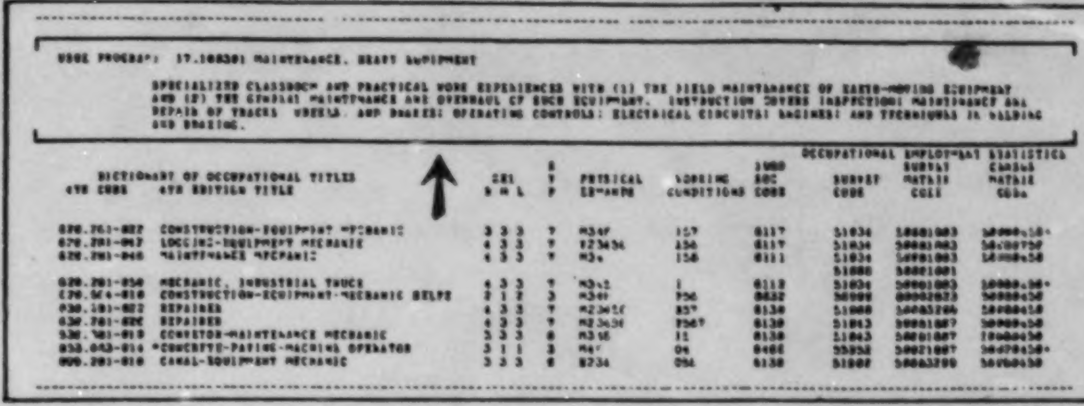
The codes and definitions for the instructional programs in the Office of Education Classification System were intended to help local and State education agencies identify, classify and properly report information about subject matter and curriculum activities. Twenty subject matter areas, plus one area for cocurricular activities and one area for general elementary and secondary education were identified in Standard Terminology for Curriculum and Instruction in Local and State School Systems, State Educational Records and Report Series, Handbook VI, Department of Health, Education and Welfare.

Seven of these areas were designated for vocational-technical education. These areas were identified and coded as follows:

01. Agriculture/Agribusiness Education
04. Distributive Education
07. Health Occupations Education
09. Home Economics Education
14. Business and Office Education
16. Technical Education
17. Trade and Industrial Education

The definitions of the vocational-technical education areas and their subject matter were determined by: (1) an extensive study of record and report forms of local school systems and State education agencies, (2) an extensive review of the professional literature concerned with subject-matter areas and cocurricular activities, and (3) conferences with numerous persons in State education agencies, local school systems, colleges and universities, and the U.S. Office of Education.

USOE PROGRAM CODES AND DESCRIPTORS



The USOE code and descriptor are the identification code and narrative description for an instructional program. Although some programs in Handbook VI have ten-digit codes, the programs defined in Vocational Preparation and Occupations generally have been limited to six-digit codes. In a few cases, eight-digit codes were used to allow for greater detail in describing instructional programs as in the above example. The interpretation of the codes is as follows:

17.100301

First 2-digit position: subject matter area
Example: 17. TRADE AND INDUSTRIAL EDUCATION

Second 2-digit position: principal segment of subject matter
Example: 17.10 CONSTRUCTION AND MAINTENANCE TRADES

Third 2-digit position: division of principal segment
Example: 17.1003 HEAVY EQUIPMENT (CONSTRUCTION)

Fourth 2-digit position: first-level detail of division of principal segment
Example: 17.100301 MAINTENANCE, HEAVY EQUIPMENT

The USOE code is flexible, ranging from broad subject matter areas (17.00) to very specific programs (17.100301). Each succeeding level of specificity is considered to be subsumed in the previous one. In assigning a code to a program, the most specific code that is applicable should be used.

The code numbers ending in "99," located at the end of each subject matter area, are intended to designate instructional programs being offered that are not identifiable by other subject matter codes. Note the addition of the word "other" to the USOE code title.

Example: 17.0199 AIRCONDITIONING, OTHER
Example: 17.1099 CONSTRUCTION AND MAINTENANCE TRADES, OTHER
Example: 17.2399 METALWORKING OCCUPATIONS, OTHER

Data Uses, Limitations or Issues

The USOE taxonomy has been utilized by various State and local educational agencies to collect vocational education program data, i.e., enrollments, completions, etc. which are reported to the U.S. Department of Education. In addition, this taxonomy is the primary coding system employed in the collection of information for the Vocational Education Data System (VEDS). The data collected are used by State and national agencies as a decisionmaking aid in administrative and planning functions.

The vocational education instructional programs specified by the USOE codes are defined in Vocational Preparation and Occupations. The descriptions of the instructional programs are composites of subject matter, rather than well-defined courses. The programs are not associated with any particular level of education but are general descriptions which may be related to several educational levels.

Special care in interpretation is necessary where four-digit USOE codes are used. The four-digit code may:

(1) indicate programs which are combinations of specialized programs such as those under it in the classification system.

Example: 17.02 APPLIANCE REPAIR includes at least two principal segment divisions, i.e., 17.0201 ELECTRICAL APPLIANCES AND 17.0202 GAS APPLIANCES.

(2) provide a means of summarizing data for an entire group. Data are aggregated to the four-digit code.

Example: 14.02 BUSINESS DATA PROCESSING SYSTEMS OCCUPATIONS may be used to include 14.0201, 14.0202, 14.020201, 14.0203, and 14.0204.

Although the codes are structured by general subject matter areas, i.e., 09. Home Economics, there may be instances in which there is a duplication of segments of subject matter at the four- and six-digit levels. For example, 09.0203 Food Management, Production and Services and 17.29 Quantity Food Occupations duplicate the subject matter content of one another. While this is not considered a problem by training program administrators, it is a problem for technicians utilizing data collected and tabulated with USOE codes for supply information.

I. Introduction

Purpose of the Guide

One of the first objectives of the U.S. Federal-State Employment Service System is to help people see themselves realistically in regard to their ability to meet job requirements. The *Guide for Occupational Exploration* is designed for that purpose. By providing information about the interests, aptitudes, adaptabilities, and other requisites of occupational groups, the *Guide* makes possible a comparison of these requirements with what the individual knows about himself or herself. It is also a tool for counselors assisting individuals in self-assessment and occupational choice.

The language of the text is simple and nontechnical, intended for any reader's use, with or without counseling help: the youth who is planning a career; the person who must, or wishes to, change jobs; the partially qualified or unqualified jobseeker; and the counselor or vocational adviser who assists others with career exploration and planning and occupational choices or changes.

Organization

The data in this publication are organized into 12 interest areas, 66 work groups, and 348 subgroups.

INTEREST AREAS

The interest areas correspond to the interest factors which were identified from the research and development activities in interest measurement conducted by the Division of Testing in the U.S. Employment Service. The interest factors represent the broad interest requirements of occupations as well as the vocational interests of individuals. Both the factors and the areas are identified by a two-digit code, for example:

01–An interest in creative expression of feelings or ideas.

WORK GROUPS

Within each interest area are work groups—jobs suitable for exploration by those who have the particular interest. Each work group contains descriptive information and a listing of jobs. Within each group, the jobs are of the same general type of work and require the same adaptabilities and capabilities of the worker. Each group has its unique four-digit code and title, for example:

01.01 Literary Arts

The number of groups in each area varies from 2 in Area 12 to 12 in Area 5.

SUBGROUPS

Within each work group, jobs are subgrouped to make it easier for the reader to distinguish among jobs. Each subgroup has its six-digit unique code and title, for example:

01.01.02 Creative Writing

Because of the number of jobs within some of the subgroups, a further clustering of these jobs by industry is made, for example, aircraft manufacturing, iron and steel, motion picture. Within the same industry designation occupations are listed in alphabetical order and also within each subgroup. If an occupation has more than one industry designation, it is listed under that which occurs first alphabetically; for example, a job having the industry designations of motion picture, radio, and tv broadcasting would be listed under "motion picture."

The following illustrates the components of the structure:

01	Artistic	(Interest area)
01.01	Literary Arts	(Work group)
01.01.02	Creative Writing	(Subgroup)

Screen Writer (motion pic, radio & tv broad.) 131.087–018
Crossword-Puzzle Maker (print. & pub.) 139.087–010
Editorial Writer (print. & pub.) 131.067–022
Biographer (profess. & kin.) 052.067–010
Copy Writer (profess. & kin.) 131.067–014
Humorist (profess. & kin.) 131.067–026
Lyricist (profess. & kin.) 131.067–034
Poet (profess. & kin.) 131.067–042
Writer, Prose, Fiction and Nonfiction (profess. & kin.) 131.067–946
Continuity Writer (radio & tv broad.) 131.087–010

Descriptive information for each group gives the kinds of job activities perfomed, the requirements made on the worker, clues for relating individuals to the type of work, preparation for entry into jobs, and other pertinent items.

To meet the needs of all the users of this publication, four appendixes are added.

Appendix A: Background and technical development of the Interest Factors and the *Guide*. Describes the concepts and procedures for the development of the interest factors, and the methodology for their use in determining interest areas in this publication. Includes the techniques and procedures used in developing the work groups and subgroups.

Appendix B. USES Interest and Aptitude Tests (measurement tests oriented to utilization of the *Guide*). Provides (1) a brief description of the USES Interest Inventory and General Aptitude Test Battery (GATB) (measures of an individual's occupational interests and aptitudes oriented to the *Guide* and its use); and (2) a listing of occupations for which specific Aptitude Test Batteries (SATB's) have been developed to aid counselors who have access to the GATB.

Appendix C: Use of the *Guide* in organizing career and occupational information resources. Contains techniques and procedures for cataloging and filing occupational information materials according to the structure in the *Guide*.

Appendix D: Alphabetic Arrangement of Occupations. Lists all the occupations in the *Guide*. Bridges the occupations in the *Dictionary of Occupational Titles* (DOT) and the subgroups in the *Guide*. Includes all occupations in the DOT, fourth edition, excepting those specifically related to the military. Occupational titles are the same as those in the *Dictionary*, followed by the industry designation(s), the *Dictionary* code, and the six-digit code from this publication. Base titles are in capital letters; undefined related titles, in initial capital letters; and alternate titles, in lower case letters.

III. Definitions of Interest Factors*

1. **ARTISTIC:**
   Interest in creative expression of feelings or ideas.

2. **SCIENTIFIC:**
   Interest in discovering, collecting, and analyzing information about the natural world and in applying scientific research findings to problems in medicine, life sciences, and natural sciences.

3. **PLANTS AND ANIMALS:**
   Interest in activities involving plants and animals, usually in an outdoor setting.

4. **PROTECTIVE:**
   Interest in the use of authority to protect people and property.

5. **MECHANICAL:**
   Interest in applying mechanical principles to practical situations, using machines, handtools, or techniques.

6. **INDUSTRIAL:**
   Interest in repetitive, concrete, organized activities in a factory setting.

7. **BUSINESS DETAIL:**
   Interest in organized, clearly defined activities requiring accuracy and attention to detail, primarily in an office setting.

8. **SELLING:**
   Interest in bringing others to a point of view through personal persuasion, using sales and promotion techniques.

9. **ACCOMMODATING:**
   Interest in catering to the wishes of others, usually on a one-to-one basis.

10. **HUMANITARIAN:**
    Interest in helping others with their mental, spiritual, social, physical, or vocational needs.

11. **LEADING-INFLUENCING:**
    Interest in leading and influencing others through activities involving high-level verbal or numerical abilities.

12. **PHYSICAL PERFORMING:**
    Interest in physical activities performed before an audience.

*See Appendix A.

IV. Summary List of Interest Areas, Work Groups, and Subgroups

01	**Artistic**
01.01	**Literary Arts**
01.01-01	Editing
01.01-02	Creative Writing
01.01-03	Critiquing
01.02	**Visual Arts**
01.02-01	Instructing and Appraising
01.02-02	Studio Art
01.02-03	Commercial Art
01.03	**Performing Arts: Drama**
01.03-01	Instructing and Directing
01.03-02	Performing
01.03-03	Narrating and Announcing
01.04	**Performing Arts: Music**
01.04-01	Instructing and Directing
01.04-02	Composing and Arranging
01.04-03	Vocal Performing
01.04-04	Instrumental Performing
01.05	**Performing Arts: Dance**
01.05-01	Instructing and Choreography
01.05-02	Performing
01.06	**Craft Arts**
01.06-01	Graphic Arts and Related Crafts
01.06-02	Arts and Crafts
01.06-03	Hand Lettering, Painting, and Decorating
01.07	**Elemental Arts**
01.07-01	Psychic Science
01.07-02	Announcing
01.07-03	Entertaining
01.08	**Modeling**
01.08-01	Personal Appearance
02	**Scientific**
02.01	**Physical Sciences**
02.01-01	Theoretical Research
02.01-02	Technology
02.02	**Life Sciences**
02.02-01	Animal Specialization
02.02-02	Plant Specialization
02.02-03	Plant and Animal Specialization
02.02-04	Food Research
02.03	**Medical Sciences**
02.03-01	Medicine and Surgery
02.03-02	Dentistry
02.03-03	Veterinary Medicine
02.03-04	Health Specialties
02.04	**Laboratory Technology**
02.04-01	Physical Sciences
02.04-02	Life Sciences
03	**Plants and Animals**
03.01	**Managerial Work: Plants and Animals**
03.01-01	Farming
03.01-02	Specialty Breeding
03.01-03	Specialty Cropping
03.01-04	Forestry and Logging
03.02	**General Supervision: Plants and Animals**
03.02-01	Farming
03.02-02	Forestry and Logging
03.02-03	Nursery and Groundskeeping
03.02-04	Services
03.03	**Animal Training and Service**
03.03-01	Animal Training
03.03-02	Animal Service
03.04	**Elemental Work: Plants and Animals**
03.04-01	Farming
03.04-02	Forestry and Logging
03.04-03	Hunting and Fishing
03.04-04	Nursery and Groundskeeping
03.04-05	Services
04	**Protective**
04.01	**Safety and Law Enforcement**
04.01-01	Managing
04.01-02	Investigating
04.02	**Security Services**
04.02-01	Detention
04.02-02	Property and People
04.02-03	Law and Order
04.02-04	Emergency Responding
05	**Mechanical**
05.01	**Engineering**
05.01-01	Research
05.01-02	Environmental Protection
05.01-03	Systems Design
05.01-04	Testing and Quality Control
05.01-05	Sales Engineering
05.01-06	Work Planning and Utilization
05.01-07	Design
05.01-08	General Engineering
05.02	**Managerial Work: Mechanical**
05.02-01	Systems
05.02-02	Maintenance and Construction
05.02-03	Processing and Manufacturing
05.02-04	Communications
05.02-05	Mining, Logging, and Petroleum Production
05.02-06	Services
05.02-07	Materials Handling
05.03	**Engineering Technology**
05.03-01	Surveying
05.03-02	Drafting
05.03-03	Expediting and Coordinating
05.03-04	Petroleum
05.03-05	Electrical-Electronic
05.03-06	Industrial and Safety
05.03-07	Mechanical
05.03-08	Environmental Control
05.03-09	Packaging and Storing
05.04	**Air and Water Vehicle Operation**
05.04-01	Air
05.04-02	Water
05.05	**Craft Technology**
05.05-01	Masonry, Stone, and Brick Work
05.05-02	Construction and Maintenance
05.05-03	Plumbing and Pipefitting
05.05-04	Painting, Plastering, and Paperhanging
05.05-05	Electrical-Electronic Systems Installation and Repair
05.05-06	Metal Fabrication and Repair
05.05-07	Machining
05.05-08	Woodworking
05.05-09	Mechanical Work
05.05-10	Electrical-Electronic Equipment Repair
05.05-11	Scientific, Medical, and Technical Equipment Fabrication and Repair
05.05-12	Musical Instrument Fabrication and Repair

05.05-13	Printing
05.05-14	Gem Cutting and Finishing
05.05-15	Custom Sewing, Tailoring, and Upholstering
05.05-16	Dyeing
05.05-17	Food Preparation
05.06	**Systems Operation**
05.06-01	Electricity Generation and Transmission
05.06-02	Stationary Engineering
05.06-03	Oil, Gas, and Water Distribution
05.06-04	Processing
05.07	**Quality Control**
05.07-01	Structural
05.07-02	Mechanical
05.07-03	Electrical
05.07-04	Environmental
05.07-05	Petroleum
05.07-06	Logging and Lumber
05.08	**Land and Water Vehicle Operation**
05.08-01	Truck Driving
05.08-02	Rail Vehicle Operation
05.08-03	Services Requiring Driving
05.08-04	Boat Operation
05.09	**Materials Control**
05.09-01	Shipping, Receiving, and Stock Checking
05.09-02	Estimating, Scheduling, and Record Keeping
05.09-03	Verifying, Recording, and Marking
05.10	**Crafts**
05.10-01	Structural
05.10-02	Mechanical
05.10-03	Electrical-Electronic
05.10-04	Structural-Mechanical-Electrical-Electronic
05.10-05	Reproduction
05.10-06	Blasting
05.10-07	Painting, Dyeing, and Coating
05.10-08	Food Preparation
05.10-09	Environmental
05.11	**Equipment Operation**
05.11-01	Construction
05.11-02	Mining and Quarrying
05.11-03	Drilling and Oil Exploration
05.11-04	Materials Handling
05.12	**Elemental Work: Mechanical**
05.12-01	Supervision
05.12-02	Mining, Quarrying, Drilling
05.12-03	Loading, Moving
05.12-04	Hoisting, Conveying
05.12-05	Braking, Switching, and Coupling
05.12-06	Pumping
05.12-07	Crushing, Mixing, Separating, and Chipping
05.12-08	Lubricating
05.12-09	Masonry
05.12-10	Heating and Melting
05.12-11	Welding
05.12-12	Structural Work
05.12-13	Cutting and Finishing
05.12-14	Painting, Caulking, and Coating
05.12-15	Mechanical Work
05.12-16	Electrical Work
05.12-17	Food Preparation
05.12-18	Cleaning and Maintenance
05.12-19	Reproduction Services
05.12-20	Signalling
06	**Industrial**
06.01	**Production Technology**
06.01-01	Supervision and Instruction
06.01-02	Machine Set-Up
06.01-03	Machine Set-Up and Operation
06.01-04	Precision Hand Work
06.01-05	Inspection
06.02	**Production Work**
06.02-01	Supervision
06.02-02	Machine Work, Metal and Plastics
06.02-03	Machine Work, Wood
06.02-04	Machine Work, Paper
06.02-05	Machine Work, Leather and Fabrics
06.02-06	Machine Work, Textiles
06.02-07	Machine Work, Rubber
06.02-08	Machine Work, Stone, Clay, and Glass
06.02-09	Machine Work, Assorted Materials
06.02-10	Equipment Operation, Metal Processing
06.02-11	Equipment Operation, Chemical Processing
06.02-12	Equipment Operation, Petroleum Processing
06.02-13	Equipment Operation, Rubber, Plastics, and Glass Processing
06.02-14	Equipment Operation, Paper and Paper Products Processing
06.02-15	Equipment Operation, Food Processing
06.02-16	Equipment Operation, Textile, Fabric, and Leather Processing
06.02-17	Equipment Operation, Clay and Coke Processing
06.02-18	Equipment Operation, Assorted Materials Processing
06.02-19	Equipment Operation, Welding, Brazing, and Soldering
06.02-20	Machine Assembling
06.02-21	Coating and Plating
06.02-22	Manual Work, Assembly Large Parts
06.02-23	Manual Work, Assembly Small Parts
06.02-24	Manual Work, Metal and Plastics
06.02-25	Manual Work, Wood
06.02-26	Manual Work, Paper
06.02-27	Manual Work, Textile, Fabric, and Leather
06.02-28	Manual Work, Food Processing
06.02-29	Manual Work, Rubber
06.02-30	Manual Work, Stone, Glass, and Clay
06.02-31	Manual Work, Laying Out and Marking
06.02-32	Manual Work, Assorted Materials
06.03	**Quality Control**
06.03-01	Inspecting, Testing, and Repairing
06.03-02	Inspecting, Grading, Sorting, Weighing, and Recording
06.04	**Elemental Work: Industrial**
06.04-01	Supervision
06.04-02	Machine Work, Metal and Plastics
06.04-03	Machine Work, Wood
06.04-04	Machine Work, Paper
06.04-05	Machine Work, Fabric and Leather
06.04-06	Machine Work, Textiles
06.04-07	Machine Work, Rubber
06.04-08	Machine Work, Stone, Glass, and Clay
06.04-09	Machine Work, Assorted Materials
06.04-10	Equipment Operation, Metal Processing
06.04-11	Equipment Operation, Chemical Processing
06.04-12	Equipment Operation, Petroleum, Gas, and Coal Processing
06.04-13	Equipment Operation, Rubber, Plastics, and Glass Processing
06.04-14	Equipment Operation, Paper Making
06.04-15	Equipment Operation, Food Processing

06.04-16	Equipment Operation, Textile, Fabric, and Leather Processing
06.04-17	Equipment Operation, Clay Processing
06.04-18	Equipment Operation, Wood Processing
06.04-19	Equipment Operation, Assorted Materials Processing
06.04-20	Machine Assembling
06.04-21	Machine Work, Brushing, Spraying, and Coating
06.04-22	Manual Work, Assembly Large Parts
06.04-23	Manual Work, Assembly Small Parts
06.04-24	Manual Work, Metal and Plastics
06.04-25	Manual Work, Wood
06.04-26	Manual Work, Paper
06.04-27	Manual Work, Textile, Fabric, and Leather
06.04-28	Manual Work, Food Processing
06.04-29	Manual Work, Rubber
06.04-30	Manual Work, Stone, Glass, and Clay
06.04-31	Manual Work, Welding, and Flame Cutting
06.04-32	Manual Work, Casting and Molding
06.04-33	Manual Work, Brushing, Spraying, and Coating
06.04-34	Manual Work, Assorted Materials
06.04-35	Laundering, Dry Cleaning
06.04-36	Filling
06.04-37	Manual Work, Stamping, Marking, Labeling, and Ticketing
06.04-38	Wrapping and Packing
06.04-39	Cleaning
06.04-40	Loading, Moving, Hoisting, and Conveying
07	**Business Detail**
07.01	**Administrative Detail**
07.01-01	Interviewing
07.01-02	Administration
07.01-03	Secretarial Work
07.01-04	Financial Work
07.01-05	Certifying
07.01-06	Investigating
07.01-07	Test Administration
07.02	**Mathematical Detail**
07.02-01	Bookkeeping and Auditing
07.02-02	Accounting
07.02-03	Statistical Reporting and Analysis
07.02-04	Billing and Rate Computation
07.02-05	Payroll and Timekeeping
07.03	**Financial Detail**
07.03-01	Paying and Receiving
07.04	**Oral Communications**
07.04-01	Interviewing
07.04-02	Order, Complaint, and Claims Handling
07.04-03	Registration
07.04-04	Reception and Information Giving
07.04-05	Information Transmitting and Receiving
07.04-06	Switchboard Services
07.05	**Records Processing**
07.05-01	Coordinating and Scheduling
07.05-02	Record Verification and Proofing
07.05-03	Record Preparation and Maintenance
07.05-04	Routing and Distribution
07.06	**Clerical Machine Operation**
07.06-01	Computer Operation
07.06-02	Keyboard Machine Operation
07.07	**Clerical Handling**
07.07-01	Filing
07.07-02	Sorting and Distribution
07.07-03	General Clerical Work
08	**Selling**
08.01	**Sales Technology**
08.01-01	Technical Sales
08.01-02	Intangible Sales
08.01-03	General Clerical Work
08.02	**General Sales**
08.02-01	Wholesale
08.02-02	Retail
08.02-03	Wholesale and Retail
08.02-04	Real Estate
08.02-05	Demonstration and Sales
08.02-06	Services
08.02-07	Driving-Selling
08.02-08	Soliciting-Selling
08.03	**Vending**
08.03-01	Peddling and Hawking
08.03-02	Promoting
09	**Accommodating**
09.01	**Hospitality Services**
09.01-01	Social and Recreational Activities
09.01-02	Guide Services
09.01-03	Food Services
09.01-04	Safety and Comfort Services
09.02	**Barber and Beauty Services**
09.02-01	Cosmetology
09.02-02	Barbering
09.03	**Passenger Services**
09.03-01	Group Transportation
09.03-02	Individual Transportation
09.03-03	Instruction and Supervision
09.04	**Customer Services**
09.04-01	Food Services
09.04-02	Sales Services
09.05	**Attendant Services**
09.05-01	Physical Conditioning
09.05-02	Food Services
09.05-03	Portering and Baggage Services
09.05-04	Doorkeeping Services
09.05-05	Card and Game Room Services
09.05-06	Individualized Services
09.05-07	General Wardrobe Services
09.05-08	Ticket Taking, Ushering
10	**Humanitarian**
10.01	**Social Services**
10.01-01	Religious
10.01-02	Counseling and Social Work
10.02	**Nursing, Therapy and Specialized Teaching Services**
10.02-01	Nursing
10.02-02	Therapy and Rehabilitation
10.02-03	Specialized Teaching
10.03	**Child and Adult Care**
10.03-01	Data Collection
10.03-02	Patient Care
10.03-03	Care of Others
11	**Leading-Influencing**
11.01	**Mathematics and Statistics**
11.01-01	Data Processing Design
11.01-02	Data Analysis
11.02	**Educational and Library Services**
11.02-01	Teaching and Instructing, General
11.02-02	Vocational and Industrial Teaching
11.02-03	Teaching, Home Economics, Agriculture, and Related
11.02-04	Library Services

11.03	**Social Research**
11.03-01	Psychological
11.03-02	Sociological
11.03-03	Historical
11.03-04	Occupational
11.03-05	Economic
11.04	**Law**
11.04-01	Justice Administration
11.04-02	Legal Practice
11.04-03	Abstracting, Document Preparation
11.05	**Business Administration**
11.05-01	Management Services: Non-Government
11.05-02	Administrative Specialization
11.05-03	Management Services: Government
11.05-04	Sales and Purchasing Management
11.06	**Finance**
11.06-01	Accounting and Auditing
11.06-02	Records Systems Analysis
11.06-03	Risk and Profit Analysis
11.06-04	Brokering
11.06-05	Budget and Financial Control
11.07	**Services Administration**
11.07-01	Social Services
11.07-02	Health and Safety Services
11.07-03	Educational Services
11.07-04	Recreational Services
11.08	**Communications**
11.08-01	Editing
11.08-02	Writing
11.08-03	Writing and Broadcasting
11.08-04	Translating and Interpreting
11.09	**Promotion**
11.09-01	Sales
11.09-02	Funds and Membership Solicitation
11.09-03	Public Relations
11.10	**Regulations Enforcement**
11.10-01	Finance
11.10-02	Individual Rights
11.10-03	Health and Safety
11.10-04	Immigration and Customs
11.10-05	Company Policy
11.11	**Business Management**
11.11-01	Lodging
11.11-02	Recreation and Amusement
11.11-03	Transportation
11.11-04	Services
11.11-05	Wholesale-Retail
11.12	**Contracts and Claims**
11.12-01	Claims Settlement
11.12-02	Rental and Leasing
11.12-03	Booking
11.12-04	Procurement Negotiations
12	**Physical Performing**
12.01	**Sports**
12.01-01	Coaching and Instructing
12.01-02	Officiating
12.01-03	Performing
12.02	**Physical Feats**
12.02-01	Performing

WORKER FUNCTIONS

Structure of Worker Functions

DATA	PEOPLE	THINGS
0 Synthesizing	0 Mentoring	0 Setting Up
1 Coordinating	1 Negotiating	1 Precision Working
2 Analyzing	2 Instructing	2 Operating-Controlling
3 Compiling	3 Supervising	3 Driving-Operating
4 Computing	4 Diverting	4 Manipulating
5 Copying	5 Persuading	5 Tending
6 Comparing	6 Speaking-Signaling	6 Feeding-Offbearing
	7 Serving	7 Handling
	8 Taking Instructions-Helping	

NOTE: The hyphenated factors Speaking-Signaling, Taking Instructions-Helping, Operating-Controlling, Driving-Operating, and Feeding-Offbearing are single functions.

Included in the concept of Setting Up, Operating-Controlling, Tending, and Feeding-Offbearing is the situation in which the worker is actually part of the setup of the machine, either as the holder and guider of the material or holder and guider of the tool.

When a worker becomes part of the machine functioning, either by reason of holding and guiding the material or holding and guiding the tool, the Worker Function should be interpreted as machine related. In these cases the worker is either Setting Up, Operating-Controlling, Tending, or Feeding-Offbearing.

When a worker is involved primarily with non-machine activities, but also has a minor relationship to a machine, the appropriate non-machine, Things worker function, should be assigned even though it may be lower in the hierarchy than the machines function.

Worker Functions Definitions and Illustrative Situations

NOTE: The examples for the Worker Functions are job-worker situations and are not to be considered as representing specific jobs.

DATA FUNCTIONS

Data: Information, knowledge, and conceptions related to data, people, or things resulting from observation, investigation, interpretation, visualization, and mental creation. Data are intangible and include numbers, words, symbols, ideas, concepts, and oral verbalization.

SYNTHESIZING: Integrating analyses of data to discover facts and/or develop knowledge concepts or interpretations.

Originates, selects, and edits verses; develops ideas for greeting cards.

Interprets play scripts and conducts rehearsals for stage presentation.

Designs artwork and prepares layouts for single and multicolor illustrations, using knowledge of illustration, layout processes, and printing techniques.

Creates satirical or humorous cartoons based on personal interpretations of current news events.

Formulates hypotheses and experimental designs to investigate problems of growth, intelligence, learning, personality, and sensory processes.

Directs choral group rehearsals and performances to achieve desired effects, such as tonal and harmonic balance, dynamics, rhythms, tempos, and shadings.

Conducts research to discover new uses for chemical by-products, and devises new procedures for preparing organic compounds.

Conceives and develops ideas for application of mathematics to the fields of science and engineering.

Composes musical compositions, inventing melodic, harmonic, and rhythmic structures to express ideas musically.

Formulates editorial policies of newspaper and originates plans for special features or projects.

Originates theme and dialogue for sketches, plays, and similar types of radio programs.

Interprets serious or comic parts by speech or gesture to portray role in theatrical production.

Creates display arrangement to attract customer interest and promote sale of merchandise.

COORDINATING: Determining time, place, and sequence of operations or action to be taken on the basis of analysis of data; executing determinations and/or reporting on events.

Plans and directs milk plant activities such as pasteurizing, separating, evaporating, drying, cooling, and bottling in the processing of milk products.

Implements rules and regulations affecting activities of municipal police department, in accordance with authority delegated by municipal code or Police Commissioner.

Plans and arranges for activities of radio or television studio and control room personnel to insure technical quality of pictures and sound for programs originating in studio or from remote pickup points.

Organizes company activities with that of public agencies to provide public services.

Plans advertising campaign to promote sale of merchandise.

Authorizes, regulates, and controls commercial airline flights, according to Government and company regulations.

Plans and establishes collection routes and directs assignment of personnel and equipment in the operation of a municipal sanitation department.

Directs the routing and controlling of oil through pipelines from wells and storage tanks to delivery points, in accordance with delivery obligations and deadlines.

Authorizes number and frequency of buses traveling over established city routes to meet the transportation needs of patrons.

Arranges activities of public and private housing projects to relocate residents, in accordance with relocation regulations, facilities, and services.

Adjusts municipal low-rent housing and rent determination programs consistent with established policies for tenant selection and eligibility.

Directs food service to patrons of a hotel, dining room, or restaurant.

Implements plans and policies affecting activities of personnel involved in routing, shipping, classifying, billing, and recording of merchandise sent out of motor-transportation warehouse.

ANALYZING: Examining and evaluating data. Presenting alternative actions in relation to the evaluation is frequently involved.

Examines sounds, observations, and reported symptoms to determine nature of engine malfunction.

Evaluates student loan applications and determines eligibility based on need and academic standing.

Selects costumes for members of a cast after a study of the styles of the period and characters to be portrayed.

Examines incoming weather data and plots anticipated weather developments on maps and charts.

Reviews and evaluates scouting reports in preparing defensive plans for a football team.

Examines patent applications and researches technical, scientific, and patent literature as a basis for recommending approval or rejection of applications.

Assays mineral samples taken from outcrops, floats, and stream channels for preliminary quantitative estimates of mineral content.

Studies loan documents, such as deeds, assignments, and mortgages, to assure conformance to escrow instructions, policy, and legal requirements.

Reviews loan applicant's financial status to obtain information necessary to grant or deny loan request.

Evaluates condition of used merchandise to obtain basis for personal estimate of cash value or trade-in allowance on new merchandise.

Investigates and evaluates consumer complaints at source and attempts to find solution, using knowledge of product.

Studies blueprints and operation of machinery or equipment in plant for evaluation of deviations from original specifications to resolve problems.

Examines course of pilotless jet airplanes and missiles from guide plane or ground radio transmitter to ascertain needed adjustments of flight characteristics.

COMPILING: Gathering, collating, or classifying information about data, people, or things. Reporting and/or carrying out a prescribed action in relation to the information is frequently involved.

Observes operation of machine as work progresses, and makes adjustments to conform to blueprints and specifications.

Classifies aircraft flight data and submits data to Dispatcher for approval and flight authorization.

Collects background information on persons who are applying for credit, employment, insurance, or adjustments.

Collects, clarifies, and records forest data such as rainfall, stream flow, and soil moisture to develop information tables.

Summarizes details of transactions in separate ledgers and transfers data to general ledger to maintain records of financial transactions of an establishment.

Collects and arranges flight arrival and departure times at specified points to construct flight schedule.

Interviews applicants for employment and processes application forms according to established procedures.

Reviews electric power rates for conformity to schedule and prepares records pertaining to operative costs, revenues, and volume consumed.

Investigates complaints from public concerning crimes and police emergencies, records complaints, and files them for future processing.

Catalogs library materials such as books, films, and periodicals, according to subject matter.

Classifies and files musical recordings, sheet music, original arrangements, and scores for individual instruments.

Maintains inventory of goods in a stockroom.

Sells footware, such as shoes, boots, overshoes, and slippers in a department store.

COMPUTING: Performing arithmetic operations and reporting on and/or carrying out a prescribed action in relation to them. Does not include counting.

Calculates cost of customers' laundry by pricing each item on customers' lists, using adding machine, calculating machine, or comptometer.

Calculates interest and principal payments on mortgage loans, using calculating machine.

Figures and quotes repair cost estimates for hosiery and gloves.

Quotes tool-rental rates, prepares rental form, issues tool, and collects fee upon return of rental tool.

Calculates the amount of fabric required to produce specified styles of garments in various sizes, using size charts.

Figures daily wages of miners from production record.

Totals payments and proves daily transactions in a car rental establishment.

Makes change for payment received for food bill, cashes checks, and issues receipts or tickets to customers.

Calculates freight or passenger charges payable to participating carriers, using rate table and calculating machine.

Determines telephone charge of customer, according to time consumed, type of call, and rate of mileage zone.

Calculates payable odds to winning bets in gambling establishment and exchanges paper currency for playing chips or coin money.

Determines cost to customer of water conditioner based on frequency of service and size of unit required.

COPYING: Transcribing, entering, or posting data.

Enters information on manifest, such as name of shipper, tonnage, and destination from bills of lading and shipper's declaration.

Records meter readings such as oil, steam, temperature, and pressure on company operating chart.

Records style, color, and stock number of yard goods on warehouse card.

Transcribes written data from production department to punchcards by means of keypunch machine.

Enters test scores of applicants on permanent office record form.

Transcribes addresses from mailing list to envelopes, cards, advertising literature, packages, and similar items.

Records quantity and length of hides from tag on bundle.

Types letters, reports, stencils, forms, or other straight copy material from corrected rough draft.

Transcribes telephone numbers onto message slips, and forwards them to delivering personnel.

Records color, quantity, material, and part number from work ticket onto production report.

Posts totals of checks and drafts to clearinghouse settlement sheets.

Types reports, bills, application forms, shipping tickets, and other matter from clerical records.

Transcribes musical scores onto stencils, colitho plates, or manuscript paper for reproduction.

Records odometer reading and amount of gas and oil used during refueling in vehicle log book.

Types notes and records of measurements, angles, elevations, and other data procured by surveying party.

COMPARING: Judging the readily observable functional, structural, or compositional characteristics (whether similar to or divergent from obvious standards) of data, people, or things.

Sorts and inspects telephone charge tickets for such billing information as destination of telegraph message and accuracy of telephone number to which charges are made.

Sorts and stacks hats, according to color, size, and style specified.

Inspects invoice of incoming articles with actual numbers and weights of articles.

Grades dressed poultry, according to size and quality.

Sorts burned clay products, such as brick, roofing tile and sewer pipe, according to form, color, and service characteristics.

Selects seasoned logs, following specification on work ticket, and examines wood for moisture content, following specified percentages.

Inspects candy in containers or on conveyor to insure that it is formed, coated, cupped, wrapped, or packed according to plant standards.

Locates and inspects conditions of assigned area of forest with respect to fire regulations to insure compliance by travelers and campers.

Examines painted surfaces of automobile to detect scratches, blemishes, and thin spots.

Inspects proof copy of Braille transcriptions against original script to detect errors and marks proofs for correction of grammatical, typographical, or compositional errors.

Walks between rails on railroad tracks to detect damaged, worn, or broken rails, pulled spikes or blots, broken fish plates, soft beds, or wash-outs.

Inspects loaded freight cars to ascertain that materials and goods, such as automobiles, lumber, or containers of explosives are securely braced and blocked according to loading specifications.

Verifies weights marked on boxes or other containers for purposes of billing or verifying bill of lading.

Inspects washed automobiles at end of automatic car wash line to insure completeness of wash job.

PEOPLE FUNCTIONS

People: Human beings; also animals dealt with on an individual basis as if they were human.

MENTORING: Dealing with individuals in terms of their total personality in order to advise, counsel, and/or guide them with regard to problems that may be resolved by legal, scientific, clinical, spiritual, and/or other professional principles.

Renders consultation to those in physical or emotional distress to enhance their spiritual comfort.

Counsels clients in legal matters.

Works out plans with parents, teachers, and children, for overcoming problems in children who have behavioral, personality, or scholastic difficulties.

Works with parolees to assist them in rehabilitation and contacts employers to promote job opportunities for them.

Provides treatment for individuals with mental and emotional disorders.

Provides individuals with vocational and educational planning services, based on professional appraisal of their interests, aptitudes, temperaments, and other personality factors.

Counsels students in educational and personal-social activities and administers student personnel programs.

Advises and assists individuals in the solution of their socio-economic problems.

Guides juvenile campers by maintaining discipline, leading groups, and instructing individuals.

NEGOTIATING: Exchanging ideas, information, and opinions with others to formulate policies and programs and/or arrive jointly at decisions, conclusions, or solutions.

Negotiates with property owners and public officials to secure purchase or lease of land and right-of-way for utility lines, pipe lines, and other construction projects.

Contacts landowners and representatives of oil-producing firms in an attempt to complete agreements such as leases, options, and royalty contracts covering oil exploration, drilling, and production activities in specified oil fields.

Arranges with officials of various organizations in each locality to rent premises for a circus, to arrange for distribution of publicity and promotional materials, and to hire musicians for the circus band.

Participates in talks to settle labor disputes. Confers with union members and prepares cases for presentation. Meets with employers to negotiate or arbitrate.

Confers with foreign shippers to agree upon reciprocal freight handling contract.

Contracts with hospitals and other institutional agencies for students to obtain clinical experience in a school of nursing.

Meets with representatives of entertainment attractions such as troupes, performers, or motion picture distributors to arrange terms of contract and fees to be paid for engagement in establishments such as nightclubs, theaters, or dance halls.

Contracts with farmers to raise or purchase fruit or vegetable crops.

INSTRUCTING: Teaching subject matter to others, or training others (including animals) through explanation, demonstration, and supervised practice; or making recommendations on the basis of technical disciplines.

Trains nursing staff in techniques of industrial nursing. Conducts classes in first aid and home nursing for employees.

Conducts classes in instrumental or vocal music for individuals or groups in public or private school.

Provides training for police recruits in police science investigative methods and techniques, government, law, community life, marksmanship, self defense, and care of firearms.

Trains wild animals such as lions, tigers, bears, and elephants to perform tricks for entertainment of audience at circus or other exhibitions.

Teaches one or more subjects in a college or university classroom.

Coaches groups at playgrounds and schools in fundamentals and rules of competitive sports. Demonstrates techniques of a game and drills players in fundamentals until they are familiar with all its phases.

Lectures, demonstrates, and uses audiovisual teaching aids to present subject matter to class.

Illustrates and explains normal and emergency driving techniques and mechanical operation of automobile, using blackboard diagrams and audiovisual aids. Observes individuals in actual driving of automobile, explaining and demonstrating operation of brakes, clutch, and gearshift or automatic transmission.

Advises farmers concerning agricultural problems. Lectures and prepares articles on subjects such as farm arrangement and soil conservation. Demonstrates practical procedures used in solving agricultural problems.

Lectures and demonstrates job fundamentals to stewardesses of a passenger airline.

SUPERVISING: Determining or interpreting work procedures for a group of workers, assigning specific duties to them, maintaining harmonious relations among them, and promoting efficiency.

> *NOTE:* A variety of responsibilities is involved in this function. While any of the following activities may indicate this function, usually a combination of them will be present in jobs appropriately rated for supervision:
>
> Determines or interprets work procedures.
>
> Assigns duties to workers.
>
> Trains workers.
>
> Evaluates workers' performances against standards.
>
> Maintains harmonious relations among workers.
>
> Promotes efficiency among workers.
>
> Assists workers in solving work problems.
>
> Initiates and/or recommends personnel actions such as firing, hiring, promoting, transferring, and disciplining.
>
> Enforces company regulations.
>
> Maintains or directs maintenance of records related to production and personnel.

Assigns guard force personnel to station or patrols. Interprets security rules and supervises subordinates in carrying out rules. Reports irregularities and hazards to appropriate personnel. Selects and trains subordinates. Insures that safety standards are maintained.

Has responsibility for workers engaged in loading ships' cargoes. Studies bills of lading to determine sequence of loading operations, calculates number of hours and personnel required, and assigns tasks to workers. Oversees workers to insure cargo is loaded in proper sequence.

Issues oral and written orders to newspaper workers engaged in gathering, writing, and publishing one type of news such as sports, society, music, drama, etc.

Directs the activities of workers engaged in distributing material to other workers and keeping records of parts worked on and completed.

Inspects engines and other equipment and orders ship crewmen to repair or replace defective parts.

Directs workers who maintain propulsion engines; boiler; deck machinery; and electrical, refrigeration, and sanitary equipment; and orders ship crewmen to repair or replace defective parts.

Interviews, hires, and gives instructions to fishing vessel crewmen, and assigns crew to watches and quarters. Directs fishing operations, using knowledge of fishing grounds and workload capacities of vessel and crew.

Establishes work procedures for workers engaged in loading and unloading kiln to dry green hops. Examines hops on kiln floor to determine distribution for drying, and gives instructions to workers concerning depth hops may be piled in kiln bay; and kiln temperature and air volume to be maintained.

Directs workers engaged in maintaining grounds and turf on golf course. Determines work priority and assigns workers to tasks such as fertilizing, seeding, mowing, raking, and spraying. Observes employees' work and demonstrates more efficient work methods.

DIVERTING: Amusing others. (Usually accomplished through the medium of stage, screen, television, or radio.)

Portrays role in dramatic production to entertain audience.

Sings classical, opera, church, or folk music in musical programs. Performs classical, modern, or acrobatic dances alone, with partner, or in groups to entertain audience.

Includes hypnotic trance in subjects, occasionally using members of audience as subjects, and commands hypnotized subjects to perform specific tasks.

Speaks in such a manner that voice appears to come from source other than own vocal chords, such as from dummy or hand puppet.

Performs original and stock tricks of illusion and sleight-of-hand to mystify audience, using props such as cards and cigarettes. Frequently uses members of audience in act.

Pilots airplane to perform stunts and aerial acrobatics at fairs and carnivals.

Dons diving suit and helmet, and drops to floor of tank to feed fish on scheduled show periods. Circulates among fish and identifies species and describes their life history in commentary over sound system.

Drives racing car over track in competition with other drivers.

Performs difficult and spectacular feats such as leaping, tumbling, and balancing, alone or as a member of team.

Professes to judge patron's character by studying his handwriting, observing details of letter formation.

Turns crank on portable barrel organ to play tunes. Trains and provides for monkey which accompanies him.

Impersonates Santa Claus during Christmas season.

PERSUADING: Influencing others in favor of a product, service, or point of view.

Confers with producers of crude oil and natural gas to purchase products at a favorable price.

Writes scripts for radio and television advertising.

Sells services of industrial psychology firms to management officials.

Calls on farmers to solicit repair business and to sell new milking equipment. Demonstrates milking machines.

Offers articles at auction, asking for bids, attempting to stimulate buying desire of bidders and closing sales to highest bidder.

Sells all types of life insurance by pointing out company programs that meet clients' insurance needs.

Plans or assists in advertising program to promote sale of company's product. Prepares advertising brochures and manuals for publication.

Writes comments on topics of current interest to stimulate or mold public opinion in accordance with viewpoints and policies of publication.

Solicits freight or storage business by visiting homes or business establishments to estimate cost of packing, crating, moving, shipping, and delivering household goods, machinery, or other material.

Contacts individuals and firms by telephone, in person, or by other means to solicit funds for charitable organization.

Sells home appliances to customer after pointing out salable features of merchandise.

Calls on retail outlets to suggest merchandising advantages of company's trading stamp plan.

Promotes use of and sells ethical drugs and other pharmaceutical products to doctors, dentists, hospitals, and retail and wholesale drug establishments.

SPEAKING-SIGNALING: Talking with and/or signaling people to convey or exchange information. Includes giving assignments and/or directions to helpers or assistants.

Directs traffic by motioning with flag when construction work obstructs normal traffic route.

Gives property man verbal directions in the placing of items on stage or set.

Confers with photographic staff to suggest improvements in artistry of camera shots.

Informs public on library activities, facilities, rules, and services.

Indicates customer bid by word, mannerism, hand, or other characteristic signal.

Interviews job applicants in an employment agency.

Answers questions from passengers concerning train routes, station, and timetable information.

Informs tourists concerning size, value, and history of establishment, points out features of interest, and gives other information peculiar to establishment.

Answers telephone to give information about company's special services to potential customers.

Signals or relays signals to operators of hoisting equipment engaged in raising or lowering loads and pumping or conveying materials.

Receives verbal complaints concerning mail delivery, mail theft, and lost mail.

Explains hunting and fishing laws to sportsmen.

Greets and introduces guests and suggests planned activities such as dancing or games.

SERVING: Attending to the needs or requests of people or animals or the expressed or implicit wishes of people. Immediate response is involved.

Receives payment for merchandise such as bakery goods, magazines, groceries, books, and tobacco selected by customer. Wraps or bags merchandise, and keeps shelves stocked with merchandise.

Rents bicycles to patrons at beach, resort, or similar recreational facility. Issues bicycle to customer, records time of transaction, and accepts payment.

Accompanies and assists ambulance driver on calls. Assists in lifting patient onto wheeled cart or stretcher and into and out of ambulance. Renders first aid such as bandaging, splinting, and administering oxygen.

Renders variety of personal services conducive to safety and comfort of airline passengers during flight.

Carries golf bags around golf course for players, handing clubs to players as requested.

Cares for elderly, handicapped, or convalescent people. Acts as aid or friend by attending to employer's personal, business or social needs.

Walks, rides bicycle, or uses public conveyances to make deliveries, and collects money from customers for cash-on-delivery orders.

Stands at upper or lower end of escalator to insure that passengers do not enter wrong conveyor. Assists elderly, infirm, or hesitant passengers in entering or leaving escalator.

Arranges wearing apparel and checks personal effects for performers and other personnel when they are on set.

Feeds and waters animals in a zoo, and cleans and disinfects their pens.

Mixes and serves alcoholic and non-alcoholic drinks following standard recipes to patrons of bar.

Bathes and gives alcohol rubs to hospital patients.

TAKING INSTRUCTIONS-HELPING: Attending to the work assignment instructions or orders of supervisor. (No immediate response required unless clarification of instructions or orders is needed.) Helping applies to "nonlearning" helpers.

> *NOTE:* Taking Instructions-Helping, the lowest level worker function involving people, consists of receiving orders or instructions and/or helping others. Although this function is present to some degree in any functional responsibility involving people, it is possible to identify jobs where the functional involvement with people is at this prescribed level. No variety of responsibility is involved in this function, and any of the following situations will be rated for Taking Instructions-Helping:
>
> Receives instructions.
> Is informed of assignments, orders, etc.
> Helps and assists other workers.
> Obtains directions.

THINGS FUNCTIONS

Things: Inanimate objects as distinguished from human beings; substances or materials, machines, tools, equipment, and products. A thing is tangible and has shape, form, and other physical characteristics.

SETTING UP: Adjusting machines or equipment by replacing or altering tools, jigs, fixtures, and attachments to prepare them to perform their functions, change their performance, or restore their proper functioning if they break down. Workers who set up one or a number of machines for other workers or who set up and personally operate a variety of machines are included here.

Mounts reels of magnetic or paper tape onto spindles, decks of cards in hoppers, bank checks in magnetic ink readersorter, notices in optical scanner, or output forms and carriage tape in printing devices, to prepare off-line computer peripheral machines for operation. Sets guides, keys, and switches according to oral instructions or run book to prepare equipment to transfer data from one form to another, print output, and read data into and out of digital computer.

Unlocks ticket dispensing machines with key and turns knobs to reset number registers to zero. Changes code slugs so that different symbols are printed on tickets. Replaces depleted reels of ticket tape, threading ends of tape through feed rollers to type rollers. Presses keys of machines to obtain sample tickets. Examines tickets to ascertain that machines are printing correctly.

Selects, positions, and secures cutters in toolhead, in spindle, or on arbor of gear cutting machines such as gear shapers, hobbers, and generators. Sets feed rates and rotation speeds of cutters and workpiece in relation to each other by selecting and mounting gears, cams, or templates, or by moving levers. Moves controls to set cutting speeds and depth of stroke and cut for reciprocating cutters, and to position tools and workpieces.

Turns screws to adjust pockets of gathering machines to accommodate signatures. Turns dials to required graduation to set grippers and feelers according to thickness being gathered, using measuring instruments. Installs specified jogging trays at discharge end of machines and adjusts flow of glue and conveyor speed, using handtools. Starts machines to process sample copies and verify accuracy of machine setup before production run by machine operators.

Selects and positions, alines, and secures electrodes, jigs, holding fixtures, guides, and stops on resistance welding and brazing machines.

Lifts specified die sections into die-casting machines that cast parts such as automobile trim, carburetor housing, and motor parts from nonferrous metals. Secures die sections in position and adjusts stroke of rams. Connects water hoses to cooling system of die. Preheats die sections. Turns valves and sets dials to regulate flow of water circulating through dies. Starts machine to produce sample casting and examines casting to verify setup.

Selects, installs, and adjusts saw blades, cutter heads, boring bits, and sanding belts in a variety of woodworking machines, using handtools and rules. Operates machines to saw, smooth, shape, bore, and sand lumber and wood parts. Periodically verifies dimensions of parts for adherence to specifications, using gages and templates.

Determines tooling required according to specifications and knowledge of operations to be performed by multiple-spindle lathe-type machines equipped with automatic indexing and feeding mechanisms to perform turning, boring, threading, and facing operations. Installs collets, bushings, and stock pushers in stock-feeding mechanisms, using wrenches and screwdrivers. Installs and adjusts cams, gears, and stops. Starts machines and observes each operation. Verifies conformance of workpiece to specifications.

PRECISION WORKING: Using body members and/or tools or work aids to work, move, guide, or place objects or materials in situations where ultimate responsibility for the attainment of standards occurs and selection of appropriate tools, objects, or materials, and the adjustment of the tool to the task require exercise of considerable judgment.

Lays out position of parts on metal, using scribe and handtools.

Locates and marks reference lines such as centerlines, buttock lines, and frame lines and marks location of holes to be drilled, using scribe.

Uses water colors, brushes, pen, and rulers to sketch original designs for textile cloth patterns on graph paper.

Carves statues, monuments, and ornaments from stone, concrete, and wood, using chisels, hammers, and knives.

Polishes screwheads to specified dimensions and finish by fitting screws in circular multihole steel block, using tweezers and suction device; grinding blocked heads on bench mounted grinding wheel to remove burs; and polishing heads on bench flatlap polisher.

Lays out, cuts, shapes, and finishes wood, plastics, plexiglass, and hardboard parts of displays, using handtools.

Prepares scale and full size drawings for use by building contractors and craftsmen.

Diagnoses electrical malfunctions, using test lights, ohmmeters, voltmeters, circuit simulators, and wiring diagrams.

Pulls bow across strings of violin with one hand and presses strings with fingers of other hand to produce desired effects.

Inspects machined parts and assembled units for conformance to specifications, using micrometers, gages, calipers, and other precision measuring instruments.

Cuts, trims, and tapers hair, using clippers, comb, and scissors.

Measures, marks, and cuts carpeting and linoleum with knife to get maximum number of usable pieces from standard size rolls, following floor dimensions and diagrams.

Forms sand molds for production of metal casting, using handtools, power tools, patterns, and flasks; and applying knowledge of variables such as metal characteristics, molding sand, contours of patterns, and pouring procedures.

Sketches design, using pencil or permanent ink. Grinds colors on pottery tile, using palette knife to mix colors and oils to desired consistency. Paints freehand or within sketched design, using mixed colors, or applies pure colors, one over another, to produce desired shade.

OPERATING-CONTROLLING: Starting, stopping, controlling, and adjusting the progress of a machine or equipment. Operating involves setting up and adjusting the machine or material(s) as the work progresses. Controlling involves observing gages, dials, etc. and turning valves and other devices to regulate factors such as temperature, pressure, flow of liquids, speed of pumps, and reactions of materials.

Turns controls on television camera; observes scenes through camera monitor; adjusts lens to maintain scenes in focus; and moves levers to alter angle or distance of shot to photograph scenes for broadcasting.

Places wooden barrel horizontally on barrel rest of barrel lathe machine. Clamps barrel between two chucks of the lathe. Starts machine and holds barrel plane against surface of revolving barrel while guiding tool along its length to scrape and smooth it.

Attaches skip bar to key punch machine. Loads machine with decks of punchcards. Moves switches and depresses keys to select duplication, spacing, and transfer of cards through machine station.

Moves lever to regulate speed of turntable of tape recorder machines. Turns knobs on cutting arms to shift or adjust weight of stylus. Moves switches to open microphone and tune in live or recorded programs.

Clamps sample of tinplate on scribing table and outlines specified areas to be coated, using scriber. Moves coater machine lever to raise uncoated tinplate into feeding position. Adjusts or changes gears of feeding mechanism to regulate rate of feed. Adjusts rollers to regulate thickness of coating materials on plate, using wrenches and rule.

Positions and bolts or clamps single or multiple dies on bed of printing press, using handtools. Loads coil of strip metal on machine spindle, feeds strip between dies, turns handwheels to close and tighten dies on metal strip and starts machine.

Places glass blanks and tube components in chuck or tailstock of lathes and depresses pedals of compressed air devices that lock parts in lathes. Starts lathes, lights gas-torch heating elements and turns valves to regulate flames. Turns handwheels or pushes levers to control heating of specified areas of glass parts.

Places spool on spindle of floor-mounted sewing machines. Draws thread through machine guides, tensions, and needle eye. Inserts bobbins into shuttles and draws thread through slots in shuttle walls or draws thread through guides and looper eyes. Presses knee levers, depresses pedals, or moves hand levers to raise presser foot or spread feed cups. Positions parts to be joined and lowers presser foot. Starts, stops, and controls speed of machines with pedals or knee levers and guides parts under needles.

Moves switches on central control panel of switchboard to regulate converters. Observes demand meters, gages, and recording instruments, and moves controls to insure efficient power utilization, equipment operation, and maintenance of power distribution. Monitors gages, alarms and oscilloscopes to detect and prevent damage to equipment and disruption of power.

Selects specified embossing plate, bolts plate into chase, and positions and secures chase onto ram of embossing machine used to imprint designs on leather or leather articles. Turns switch or steam valve to heat plate to specified temperature, according to type of leather. Pulls lever that lowers ram to impress designs on leather.

Fires furnace or kiln, observes gages, and adjusts controls to maintain specified temperature for drying coal and ore before or after washing, milling, or pelletizing operations.

Regulates flow and pressure of gas from mains to fuel feed lines of gas-fired boilers, furnaces, kilns, soaking pits, smelters, and related steam-generating or heating equipment. Opens valve on feed lines to supply adequate gas for fuel, and closes valves to reduce gas pressure. Observes, records, and reports flow and pressure gage readings on gas mains and fuel feed lines.

Types payroll.

DRIVING-OPERATING: Starting, stopping, and controlling the actions of machines or equipment for which a course must be steered, or which must be guided, in order to fabricate, process, and/or move things or people.

> *NOTE:* Involves such activities as observing gages and dials; estimating distances and determining speed and direction of other objects; turning cranks and wheels; pushing or pulling gear lifts or levers. Includes such machines as cranes, conveyor systems, tractors, furnace charging machines, paving machines, and hoisting machines. Excludes manually powered machines, such as handtrucks and dollies, and power assisted machines, such as electric wheelbarrows and handtrucks.

Steers vessel over course indicated by electronic equipment, such as radio, fathometer, and land radar to transport passengers to fishing locations for catching fish and other marine life.

Pushes pedals and pulls levers to move, control speed and stop crane, turn crane boom, and raise or lower cables attached to load. Adjusts controls to move and position load by sight or at direction of other worker.

Pilots airplane or helicopter over agricultural fields at low altitudes to dust or spray fields with seeds, fertilizers, or pesticides.

Operates throttle, air brakes, and other controls to transport passengers or freight on electric, diesel-electric, steam, or gas-turbine-electric locomotive. Interprets train orders, block or semaphore signals, and railroad rules and regulations.

Fastens attachments, such as graders, plows, and rollers to tractor with hitchpins. Releases brake, shifts gears, and depresses accelerator or moves throttle to control forward and backward movement of machine. Steers tractor by turning steering wheel and depressing brake pedals.

Pushes levers and pedals to move machine, to lower and position dipper into material, and to lift, swing, and dump contents of dipper into truck, car, or onto conveyor or stock pile.

Moves control levers, cables, or other devices to control movement of elevator. Opens and closes safety gate and door of elevator at each floor where stop is made.

Controls movement and stops railroad or mine cars by switching, applying brakes, placing sprags (rods) between wheelspokes or placing wooden wedges between wheel and rail. Positions cars under loading chutes by inserting pinch bar under car wheels, using bar as fulcrum and lever to move car. Hooks cable to car and controls cable drum brake to ease car down incline.

Moves controls to steer armored car to deliver money and valuables to business establishments.

Controls action of rail-mounted trackmobile to spot railroad cars on ramp above chip storage bins for unloading, and releases bottom doors of cars allowing chips to fall into bin.

Moves controls to activate rotary brushes and spray so that sweeping machine picks up dirt and trash from paved street and deposits it in the dirt trap in rear of machine.

MANIPULATING: Using body members, tools, or special devices to work, move, guide, or place objects or materials. Involves some latitude for judgment with regard to precision attained and selecting appropriate tool, object, or material, although this is readily manifest.

Shapes knitted garment after cleaning by shrinking or stretching garments by hand to conform to original measurements.

Trims and smooths edges, surfaces, and impressed or raised designs of jewelry articles and jewelry findings, using files, chisels, and saws.

Scrapes, files, and sands machine-shaped gunstocks to remove excess wood and impart finished appearance to surface, using files, sandpaper, and emery cloth.

Draws different color strips of material such as fabric of leather between slits in shoe upper to weave decorative design, according to specifications.

Turns sprayer valves and nozzle to regulate width and pressure of spray, pulls trigger and directs spray onto work surface to apply prime or finish coat, according to knowledge of painting techniques.

Guides tip of soldering iron along seam of metal plates to heat plates to bonding temperature and dips bar or wire of soft solder in seam to solder joint.

Mixes soldering flux in crock or vat, according to formula, using paddle, and tests consistency of flux with hydrometer.

Repacks parachutes that have been opened in use, or unopened ones that are to be repacked in interest of safety.

Attaches cables to buildings, installs supports, and cuts or drills holes in walls and partitions through which cables are extended, using wrenches, pliers, screwdrivers, saws, and drills.

TENDING: Starting, stopping, and observing the functioning of machines and equipment. Involves adjusting materials or controls of the machine, such as changing guides, adjusting timers and temperature gages, turning valves to allow flow of materials, and flipping switches in response to lights. Little judgment is involved in making these adjustments.

Positions and secures scoring disks on machine shaft, turns handwheel to adjust pressure on disks, and feeds cardboard blanks into machine hopper.

Turns controls to regulate amount of coal, pushes air blowers controls that blow coal into furnaces, and observes air gages and feed of coal.

Presses pedal or button, and moves lever on packaging machine. Observes operation to detect malfunctions. Opens valves, changes cutting dies, sets guides, and clears away damaged products or containers.

Lights fire and opens valves to regulate fuel supply to asphalt-heater. Screws hose connections to heater to connect circulating system, and uses pump to circulate asphalt through heating unit. Observes temperature gage and adjusts blower and damper controls to regulate heat and maintain required temperature.

Adjusts control that regulates stroke of paper pusher on machine that assembles pages of printed material in numerical sequence. Places pages to be assembled in holding tray. Turns controls manually to start machine and removes assembled pages from machine.

Depresses pedal to start, stop, and control speed of yarn winding machine. Observes yarn to detect slubs and broken or tangled ends, cuts out slubs, using scissors, and ties broken yarn ends.

Positions spring on bed of machine, turns hand gages to regulate travel of flattening ram, and pulls lever to lower ram that compresses spring under specified pressure.

Places tack in holder on machine bed. Positions premarked article over tack on bed and positions button on garment over tack and under machine ram. Depresses pedal that lowers ram to join button to article.

Shovels coal or coke into firebox of boiler, turns valves to regulate flow of gas, oil, or pulverized coal into firebox, or moves controls to regulate feeding speed of automatic stoker. Reads gages and moves controls to maintain specified steam pressure, temperature, and water level in boiler.

FEEDING-OFFBEARING: Inserting, throwing, dumping, or placing materials in or removing them from machines or equipment which are automatic or tended or operated by other workers.

Inserts milled rubber stock into rolls of calendaring machine to maintain continuous supply.

Places molded lens blanks into automatic bur-grinding machine. Catches ejected blanks and stacks them in trays prior to polishing.

Picks up and dumps specified dry materials into feeder hopper of crutcher equipment which forms slurry for processing into soap.

Hangs toy parts in specified positions on hooks of overhead conveyor that passes through painting operations and lifts painted parts from hooks.

Places eggs in holder that carries them into machine that removes earth, straw, and other residue from egg surface prior to shipment. Removes cleaned eggs and packs them in cases.

Places plate glass onto conveyor of glass silvering machine or automatic washing and drying machines, and removes silvered or cleaned mirror from conveyor.

Shovels scrap tobacco onto screens of cleaning machine, picks out stems and dirt from tobacco, and shovels tobacco dust from receptacle under screen into containers.

Dumps dyed cotton fiber into hopper of extractor that removes liquid by forcing cotton through rollers.

Places soiled garments into washing machine, extractor, and tumbler, and removes garments at completion of cleaning cycle.

Places uncured sponge rubber blanks in cavities of hard rubber molds, positions filled molds on conveyor of vulcanizing press, and unloads vulcanized arch cushions from machine.

HANDLING: Using body members, handtools, and/or special devices to work, move, or carry objects or materials. Involves little or no latitude for judgment with regard to attainment of standards or in selecting appropriate tool, object, or material.

Loads and pushes handtruck to move metal molds of pipemaking concrete from forming area to steam-cooking area.

Hammers steel pins into holes in ends of logs preparatory to skidding.

Drives flock of goats to fresh pastures during day and back to corral at night.

Clears stumps, trees, brush, cactus, mesquite, or other growth from land so land can be used as pasture, for cultivation, or for proposed construction project.

Weighs materials in chemical plant and writes or stencils identifying information on containers. Fastens caps or covers on containers, or screws bungs in place. Transports materials, using handtruck. Cleans stills and other equipment, using detergents. Loads railroad cars or trucks.

Distributes work cards containing instructions to workers.

Scrubs and washes surgical instruments.

Mops, sweeps, and dusts halls and corridors.

Digs ditches that drain excess moisture from land, using pick and shovel.

Loads handtruck with ingots or sorted scrap.

Lifts plastic forms used in molding process from self-sealing fuel tanks.

Wipes cured tires with soapstone powder to dry them.

Uses knife to cut candy into squares.

Folds and stacks cuffs preparatory to sewing cuffs to sleeves of garments.

Scrapes or knocks mortar from bricks, using hammer.

Handles sheet music when rehearsing for performance as soloist or as member of vocal ensemble.

Uses pen to write magazine articles.

Worker Traits

The requirements made on the worker in terms of aptitudes, general educational development, vocational preparation, physical demands, and personal traits are expressed by worker traits. These are reflected in the following components: (a) training time, (b) aptitudes, (c) temperaments, (d) interest, and (e) physical demands and environmental conditions.

Data relating to these job facets provide a sharper focus on the type of work involved and the nature of the individual worker. They are extremely helpful in counseling, job development, training, and other activities directed toward maximum manpower utilization, especially for less-than-fully qualified persons.

The following are definitions of the worker traits components:

TRAINING TIME is the amount of general educational development and specific vocational preparation required of a worker to acquire the knowledge and abilities necessary for average performance in a particular job-worker situation.

(a) *General Educational Development (GED)* embraces those aspects of education (formal and informal) which contribute to the worker's: (1) reasoning development and ability to follow instructions, and (2) acquisition of "tool" knowledge, such as language and mathematical skills.

(b) *Specific Vocational Preparation (SVP)* is the amount of time required to learn the techniques, acquire information, and develop the facility needed for average performance in a specific job-worker situation. This training may be acquired in a school, work, military, institutional, or avocational environment.

APTITUDES are the specific capacities or abilities required of an individual in order to facilitate the learning of some task or job duty. Following are the aptitudes included in this component:

G Intelligence
V Verbal
N Numerical
S Spatial
P Form Perception
Q Clerical Perception
K Motor Coordination
F Finger Dexterity
M Manual Dexterity
E Eye-Hand-Foot Coordination
C Color Discrimination

TEMPERAMENTS for the purpose of collecting occupational data, are defined as "personal traits" required of a worker by specific job-worker situations. This component consists of the following 10 factors:

D–DCP	Adaptability to accepting responsibility for the direction, control, or planning of an activity.

F–FIF	Adaptability to situations involving the interpretation of feelings, ideas, or facts in terms of personal viewpoint.
I–INFLU	Adaptability to influencing people in their opinions, attitudes, or judgments about ideas or things.
J–SJC	Adaptability to making generalization, evaluations, or decisions based on sensory or judgmental criteria.
M–MVC	Adaptability to making generalizations, evaluations, or decisions based on measurable or verifiable criteria.
P–DEPL	Adaptability to dealing with people beyond giving and receiving instructions.
R–REPCON	Adaptability to performing repetitive work, or to performing continuously the same work, according to set procedures, sequence, or pace.
S–PUS	Adaptability to performing under stress when confronted with emergency, critical, unusual, or dangerous situations; or situations in which working speed and sustained attention are make-or-break aspects of the job.
T–STS	Adaptability to situations requiring the precise attainment of set limits, tolerances, or standards.
V–VARCH	Adaptability to performing a variety of duties, often changing from one task to another of a different nature without loss of efficiency or composure.

INTERESTS:—"An interest is a tendency to become absorbed in an experience and to continue it, while an aversion is a tendency to turn away from it to something else."[3]

The Interest factors are as follows:

1a.	A preference for activities dealing with things and objects.	*vs*	1b.	A preference for activities concerned with the communication of data.[4]
2a.	A preference for activities involving business contact with people.	*vs*	2b.	A preference for activities of a scientific and technical nature.
3a.	A preference for activities of a routine, concrete, organized nature.	*vs*	3b.	A preference for activities of an abstract and creative nature.
4a.	A preference for working for the presumed good of people.	*vs*	4b.	A preference for activities that are carried on in relation to processes, machines, and techniques.
5a.	A preference for activities resulting in prestige or the esteem of others.	*vs*	5b.	A preference for activities resulting in tangible, productive satisfaction.

PHYSICAL DEMANDS are defined as the physical requirements made of the worker by the specific job-worker situation. They include:

1. Strength (lifting, carrying, pushing, and/or pulling)
    - Sedentary work
    - Light work
    - Medium work
    - Heavy work
    - Very heavy work
2. Climbing and/or balancing
3. Stooping, kneeling, crouching, and/or crawling
4. Reaching, handling, fingering, and/or feeling
5. Talking and/or hearing
6. Seeing

---

[3] Bingham, W. V., *Aptitudes and Aptitude Testing* (New York and London: Harper & Brothers, 1937).

[4] Involvement with live animals is to be identified with "people and the communication of data" wherever an animal is dealt with on an individual basis.

ENVIRONMENTAL CONDITIONS are those physical surroundings of job-worker situations which make specific demands upon a worker's physical capacity. They include:

1. Work location (inside, outside, or both)
2. Extreme cold with or without temperature changes
3. Extreme heat with or without temperature changes
4. Wet and/or humid
5. Noise and/or vibration
6. Hazards
7. Atmospheric conditions

Definition

For the purpose of rating jobs, TRAINING TIME is defined as the amount of general educational development and specific vocational preparation required of a worker to acquire the knowledge and abilities necessary for average performance in a particular job-worker situation.

GENERAL EDUCATIONAL DEVELOPMENT (GED)

GED embraces those aspects of education (formal and informal) which contribute to the worker's (a) reasoning development and ability to follow instructions, and (b) acquisition of "tool" knowledges such as language and mathematical skills. This is education of a general nature which does not have a recognized, fairly specfic occupational objective. Ordinarily, such education is obtained in elementary school, high school, or college. However, it derives also from experience and self-study.

SPECIFIC VOCATIONAL PREPARATION (SVP)

SVP is the amount of time required to learn the techniques, acquire the information, and develop the facility needed for average performance in a specific job-worker situation.

This training may be acquired in a school, work, military, institutional, or vocational environment. It does not include orientation training required of a fully qualified worker to become accustomed to the special conditions of any new job. Specific vocational training includes:

(a) *Vocational education* (high school commercial or shop training, technical school, art school, and that part of college training which is organized around a specific vocational objective).[1]

(b) *Apprenticeship training* (training obtained only in those jobs offering apprenticeships).

(c) *Inplant training* (training given by employer in form of organized classroom study).

(d) *On-the-job training* (instruction given to learner or trainee on the job by a qualified worker).

(e) *Essential experience in other jobs* (experience received in less responsible jobs or other jobs which qualify for a higher grade job.

DIVISIONS OF GED SCALE

The GED Scale is composed of three divisions: Reasoning development, mathematical development, and language development. Each should be considered independently of the others in evaluating the level required for the job.

RATIONALE FOR GED SCALE DEFINITIONS

The description of the various levels of language and mathematical development are based on the curriculum being taught at specified grade levels in schools throughout the United States. An analysis of mathematics courses in the school curriculums reveals distinct levels of progression in the primary and secondary grades and college. These levels of progression facilitated the selection and assignment of six levels of GED for the mathematical development scale.

However, though language courses follow a similar pattern of progression in primary and secondary school, particularly in learning and applying the principles of grammar, this pattern changes at the college level. The diversity of language courses offered at the college level precludes the establishment of distinct levels of language progression for these 4 years. Consequently, language development is limited to five levels of GED.

---

[1] In evaluating training time information on jobs, observe the following standards: (1) Regard 30 hours of high school shop or commercial training as equivalent to about 15 hours of on-the-job training; (2) regard the average 4-year college curriculum (except for liberal arts) as equivalent to about 2 years of specific vocational preparation; (3) regard each year of graduate schooling as a year of specific vocational preparation.

Scale of General Education Development (GED)

LEVEL	REASONING DEVELOPMENT	MATHEMATICAL DEVELOPMENT	LANGUAGE DEVELOPMENT
6	Apply principles of logical or scientific thinking to a wide range of intellectual and practical problems. Deal with nonverbal symbolism (formulas, scientific equations, graphs, musical notes, etc.) in its most difficult phases. Deal with a variety of abstract and concrete variables. Apprehend the most abstruse classes of concepts.	**Advanced calculus:** Work with limits, continuity, real number systems, mean value theorems, and implicit function theorems. **Modern algebra:** Apply fundamental concepts of theories of groups, rings, and fields. Work with differential equations, linear algebra, infinite series, advanced operations methods, and functions of real and complex variables. **Statistics:** Work with mathematical statistics, mathematical probability and applications, experimental design, statistical inference, and econometrics.	**Reading:** Read literature, book and play reviews, scientific and technical journals, abstracts, financial reports, and legal documents. **Writing:** Write novels, plays, editorials, journals, speeches, manuals, critiques, poetry, and songs. **Speaking:** Conversant in the theory, principles, and methods of effective and persuasive speaking, voice and diction, phonetics, and discussion and debate.
5	Apply principles of logical or scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of technical instructions in mathematical or diagrammatic form. Deal with several abstract and concrete variables.	**Algebra:** Work with exponents and logarithms, linear equations, quadratic equations, mathematical induction and binomial theorem, and permutations. **Calculus:** Apply concepts of analytic geometry, differentiations and integration of algebraic functions with applications. **Statistics:** Apply mathematical operations to frequency distributions, reliability and validity of tests, normal curve, analysis of variance, correlation techniques, chi-square application and sampling theory, and factor analysis.	Same as Level 6.
4	Apply principles of rational systems[1] to solve practical problems and deal with a variety of concrete variables in situations where only limited standardization exists. Interpret a variety of instructions furnished in written, oral, diagrammatic, or schedule form.	**Algebra:** Deal with system of real numbers; linear, quadratic, rational, exponential, logarithmic, angle and circular functions, and inverse functions; related algebraic solution of equations and inequalities; limits and continuity, and probability and statistical inference. **Geometry:** Deductive axiomatic geometry, plane and solid; and rectangular coordinates. **Shop Math:** Practical application of fractions, percentages, ratio and proportion, mensuration, logarithms, slide rule, practical algebra, geometric construction, and essentials of trigonometry.	**Reading:** Read novels, poems, newspapers, periodicals, journals, manuals, dictionaries, thesauruses, and encyclopedias. **Writing:** Prepare business letters, expositions, summaries, and reports, using prescribed format and conforming to all rules of punctuation, grammar, diction, and style. **Speaking:** Participate in panel discussions, dramatizations, and debates. Speak extemporaneously on a variety of subjects.

LEVEL	REASONING DEVELOPMENT	MATHEMATICAL DEVELOPMENT	LANGUAGE DEVELOPMENT
3	Apply commonsense understanding to carry out instructions furnished in written, oral, or diagrammatic form. Deal with problems involving several concrete variables in or from standardized situations.	Compute discount, interest, profit, and loss; commission, markup, and selling price; ratio and proportion, and percentage. Calculate surfaces, volumes, weights, and measures. Algebra: Calculate variables and formulas; monomials and polynomials; ratio and proportion variables; and square roots and radicals. Geometry: Calculate plane and solid figures; circumference, area, and volume. Understand kinds of angles, and properties of pairs of angles.	Reading: Read a variety of novels, magazines, atlases, and encyclopedias. Read safety rules, instructions in the use and maintenance of shop tools and equipment, and methods and procedures in mechanical drawing and layout work. Writing: Write reports and essays with proper format, punctuation, spelling, and grammar, using all parts of speech. Speaking: Speak before an audience with poise, voice control, and confidence, using correct English and well-modulated voice.
2	Apply commonsense understanding to carry out detailed but uninvolved written or oral instructions. Deal with problems involving a few concrete variables in or from standardized situations.	Add, subtract, multiply, and divide all units of measure. Perform the four operations with like common and decimal fractions. Compute ratio, rate, and percent. Draw and interpret bar graphs. Perform arithmetic operations involving all American monetary units.	Reading: Passtive vocabulary of 5,000–6,000 words. Read at rate of 190–215 words per minute. Read adventure stories and comic books, looking up unfamiliar words in dictionary for meaning, spelling, and pronunciation. Read instructions for assembling model cars and airplanes. Writing: Write compound and complex sentences, using cursive style, proper end punctuation, and employing adjectives and adverbs. Speaking: Speak clearly and distinctly with appropriate pauses and emphasis, correct pronunciation, variations in word order, using present, perfect, and future tenses.
1	Apply commonsense understanding to carry out simple one- or two-step instructions. Deal with standardized situations with occasional or no variables in or from these situations encountered on the job.	Add and subtract two digit numbers. Multiply and divide 10's and 100's by 2, 3, 4, 5. Perform the four basic arithmetic operations with coins as part of a dollar. Perform operations with units such as cup, pint, and quart; inch, foot, and yard; and ounce and pound.	Reading: Recognize meaning of 2,500 (two- or three-syllable) words. Read at rate of 95-120 words per minute. Compare similarities and differences between words and between series of numbers. Writing: Print simple sentences containing subject, verb, and object, and series of numbers, names, and addresses. Speaking: Speak simple sentences, using normal word order, and present and past tenses.

---

[1] Examples of rational systems are: bookkeeping, internal combustion engines, electric wiring systems, house building, nursing, farm management, and navigation.

ILLUSTRATIVE SITUATIONS

A sampling has been made of job-worker situations for each level on each scale. These situations have been written to make their level value as explicit as possible. Since the discrimination by level is dependent on verbal expression, it is not precise. Familiarity with the total range of illustrative situations should contribute, however, to the use and application of the scales.

Definitions and Illustrative Situations for GED Levels

REASONING DEVELOPMENT

Level 1

Apply commonsense understanding to carry out simple one- or two-step instructions. Deal with standardized situations with occasional or no variables in or from these situations encountered on the job.

Mark size, lot number, contents, or other identifying information or symbols on containers or directly on articles by placing stencil on object and rubbing ink or paint brush across open lettering.

Covers drycleaned clothing and household articles with plastic bags, and sorts articles for route delivery. Hangs drycleaned articles on rail according to route number or color of drycleaning ticket.

Scans rags for hardware such as buttons and snaps, and holds rags against rotating blade that cuts hardware from rags and cuts rags into specified size. Sorts rags into bins according to color and fabric.

Tends bandsaw that cuts wooden stock for toys and games. Stacks number of pieces of stock on cutting table against preset ripping fence. Pushes cutting table against saw until stock is severed. Drops cut pieces into tote box.

Feeds eggs into machine that removes earth, straw, and other residue from egg surface prior to shipment. Places eggs in holder that carries them into machine where rotating brushes or water sprays remove residue. Removes cleaned eggs from discharge trough and packs them in cases for shipment.

Level 2

Apply commonsense understanding to carry out detailed but uninvolved written or oral instructions. Deal with problems involving a few concrete variables in or from standardized situations.

Guards street crossing during school hours when children are going to and from school. Directs actions of children and traffic at street intersections to insure safe crossing. Records license numbers of vehicles disregarding traffic signals and reports them to police.

Delivers messages, documents, packages, and other items to offices or departments within establishments or to other business concerns, walking, using bicycle or motorcycle, or riding public conveyances.

Screws watch balance and balance bride assembly to pillar plate. Places pillar plate in holding fixture, and positions balance and bride assembly on plate securing it with screws. Tests balance for vertical play by gently moving it up and down with tweezers, determining from experience if shake is within acceptable limits. Touches oil-filled hypodermic needle to jewel to oil lower balance jewel prior to assembling. Observes minute parts with aid of loupe and handles parts with tweezers.

Assists customer to launder or dryclean clothes, using self-service equipment. Gives instructions to customer in clothes preparations, such as weighing, sorting, fog-spraying spots, and removing perishable buttons. Assigns machine and points out posted instructions regarding equipment operation.

Level 3

Apply commonsense understanding to carry out instructions furnished in written, oral, or diagrammatic form. Deal with problems involving several concrete variables in or from standardized situations.

Operates cord or cordless switchboard to provide answering service for clients. Greets caller and announces name or phone number of client. Records and delivers messages, furnishes information, accepts orders, and relays calls. Places telephone calls at request of client or to locate client in emergencies. Files messages.

Requisitions transportation from motor, railroad, and airline companies to ship plant products. Reads shipping orders to determine quantity and type of transportation needed. Contacts company to make arrangements and to issue instructions for loading products. Annotates shipping orders to inform shipping department of loading locations and time of arrival of transportation.

Installs and adjusts television receivers and antennas, using handtools. Selects antenna according to type of set and location of transmitting station. Secures antenna in place with bracket and guy wire, observing insurance codes and local ordnances to protect installation from lightning and other hazards. Tunes receiver on all channels and adjusts screws to obtain desired density, linearity, focus, and size of picture.

Sets up and adjusts compression, injection, or transfer machines used to mold plastic materials to specified shape. Adjusts stroke of ram, using handtools. Connects steam, oil, or water lines to mold or regulates controls to regulate mold temperature. Sets machine controls to regulate forming pressure of machine and curing time of plastic in mold.

Cares for patients and children in private homes, hospitals, sanitariums, and similar institutions. Takes and records temperature, pulse, and respiration rate. Gives standard medications as directed by physician or nurse. Sterilizes equipment and supplies, using germicides, sterilizer, or autoclave. Prepares food trays, feeds patients, and records food and liquid intake and output.

Level 4

Apply principles of rational systems[3] to solve practical problems and deal with a variety of concrete variables in situations where only limited standardization exists. Interpret a variety of instructions furnished in written, oral, diagrammatic, or schedule form.

Plans layout and installs and repairs wiring, electrical fixtures, apparatus, and control equipment. Plans new or modified installations according to specifications and electrical code. Prepares sketches showing locations of all wiring and equipment or follows diagrams or blueprints prepared by others. Tests continuity of circuit to insure electrical compatibility and safety of all components, using standard instruments, as ohmmeter, battery, and oscilloscope.

Inspects internal combustion engine for conformance to blueprints and specifications, using measuring instruments and handtools. Reviews test data to locate assemblies and parts not functioning according to specifications. Measures dimensions of disassembled parts and assemblies, such as pistons, valves, bearings, and injectors, using scale, micrometers, special tools, and gaging setups. Compares measurements against specifications to locate faulty parts.

Draws and letters charts, schedules, and graphs to illustrate specified data, such as wage trends, absenteeism, labor turnover, and employment needs, using drafting instruments, such as ruling and lettering pens, T-squares, and straightedge.

Schedules appointments, gives information to callers, takes dictation, and relieves officials of minor administrative and business details. Reads and routes incoming mail. Composes and types routine correspondence. Greets visitors, ascertains nature of business, and conducts visitors to appropriate person.

Renders general nursing care to patients in hospital, infirmary, sanitarium, or similar institution. Administers prescribed medications and treatments in accordance with approved techniques. Prepares equipment, and aids physician during treatments and examinations of patients. Observes, records, and reports to supervisor or physician patients' conditions, reactions to drugs, treatments, and significant incidents.

Level 5

Apply principles of logical or scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of technical instructions in mathematical or diagrammatic form. Deal with several abstract and concrete variables.

---

[3] Examples of "rational systems": bookkeeping, internal combustion engines, electric wiring systems, house building, nursing, farm management, and navigation.

Interviews persons with problems, such as personal and family maladjustment, lack of finances, unemployment, and physical and mental impairment, to determine nature and degree of problems. Obtains and evaluates patient data, such as physical, psychological, and social factors. Counsels patients individusually or in groups and assists them to plan for solution of problems.

Studies clerical and statistical methods in commercial or industrial establishments to develop improved and standardized procedures. Consults supervisors and clerical workers to ascertain functions of offices or sections, methods used, and personnel requirements. Prepares reports on procedures and tasks of individual workers.

Interviews property holders and adjusts damage claims resulting from activities connected with prospecting, drilling, and production of oil and gas, and laying of pipelines on private property. Examines property titles to determine their validity, and acts as company agent in transactions with property owners. Investigates and assesses damage to crops, fences, and other properties, and negotiates claim settlements with property owners. Collects and prepares evidence to support contested damage in court.

Studies traffic conditions on urban or rural arteries from fixed position, vehicle, or helicopter to detect unsafe or congested conditions and to observe locations of alternative routes . Evaluates statistical and physical data supplied by engineering department regarding such considerations as vehicle count per mile, load capacity of pavement, feasibility of widening pavement, and projected traffic load in future.

Prepares and conducts inservice training for company personnel. Evaluates training needs in order to develop educational materials for improving performance standards. Performs research relating to course preparation and presentation. Compiles data for use in writing manuals, handbooks, and other training aids. Develops teaching outlines and lesson plans, determines content and duration of courses, and selects appropriate instructional procedures, based on analysis of training requirements for company personnel.

Level 6

Apply principles of logical or scientific thinking to a wide range of intellectual and practical problems. Deal with nonverbal symbolism (formulas, scientific equations, graphs, musical notes, etc.) in its most difficult phases. Deal with a variety of abstract and concrete variables. Comprehend the most abstruse classes of concepts.

Designs and conducts experiments to study problems in human and animal behavior. Formulates hypotheses and experimental designs to investigate problems of growth, intelligence, learning, personality, and sensory processes. Selects, controls, and modifies variables in laboratory experiments with humans and animals. Analyzes data and evaluates its significance in relation to original hypotheses.

Reconstructs records of extinct cultures, especially preliterate cultures. Studies, classifies, and interprets artifacts, architectural features, and types of structures to determine their age and cultural identity. Establishes chronological sequence of development of each culture from simpler to more advanced levels.

Arbitrates, advises, and administers justice in a court of law. Establishes rules of procedures on questions for which standard procedures have not been established by law or by a superior court. Examines evidence in criminal cases to determine if charges are true or to determine if evidence will support charge. Instructs jury on application of facts to questions of law.

Interprets results of experiments in physics, formulates theories consistent with data obtained, and predicts results of experiments designed to detect and measure previously unobserved physical phenomena. Applies mathematical methods to solution of physical problems.

Plans, organizes, and conducts research for use in understanding social problems and for planning and carrying out social welfare programs. Develops research designs on basis of existing knowledge and evolving theory. Constructs and tests methods of collecting data. Collects information and makes judgments through observation and interviews, and review of documents. Analyzes and evaluates data. Interprets methods employed and findings to individuals within agency and community.

MATHEMATICAL DEVELOPMENT

Level 1

Add and subtract two-digit numbers.

Multiply and divide 10's and 100's by 2, 3, 4, 5.

Perform the four basic arithmetic operations with coins as part of a dollar.

Perform operations with units such as cup, pint, and quart; inch, foot, and yard; ounce and pound.

Weighs items as a part of the packing process, using balance scales. Places container on scale and adds to or removes portion of contents from container until scale registers specified weight.

Dips sheets of muslin in shellac, tacks sheets in layers on stretcher frame to dry, and measures and cuts dried fabric into squares of specified size, using tape measure and shears.

Transfers hog-back skins from vat to grading table and measures size and length of skin on graduated board. Separates skins according to size.

Counts novelty case parts to verify amount specified on work ticket and stacks and bundles parts prior to spraying.

Tends battery of automatic machines equipped with circular knives that cut paper tubing into containers for shotgun shells. Fills hopper with tubes and starts machine. Verifies length of containers for conformance to standards, using fixed gage.

Level 2

Add, subtract, multiply, and divide all units of measure.

Perform the four operations with like or common decimal fractions.

Compute ratio, rate, and percent.

Draw and interpret bar graphs.

Perform arithmetic operations involving all American monetary units.

Measures, marks, and cuts carpeting and linoleum with knife to get maximum number of usable pieces from standard size rolls, following floor dimensions or diagrams.

Measures width of pleats in women's garments, using yardstick. Counts number of pleats in garment and multiplies the number by the price per pleat to determine service charge for cleaning garment.

Weighs and measures specified quantities of ingredients of infant formulas, using scales, graduated measures, and spoons. Computes number of calories per fluid ounce of formula.

Sells cigars, cigarettes, corsages, and novelties to patrons in hotels, nightclubs, and restaurants. Collects cash for items sold and makes change.

Drives truck to transport materials to specified destinations such as railroad stations, plants, or residences. Calculates amount of bill and delivery charge, collects payment for goods delivered, making change as necessary.

Level 3

Compute discount, interest, profit, and loss; commission, markup, and selling price; ratio and proportion, and percentage.

Calculate surfaces, volume, weights, and measures.

Algebra: Calculate variables and formulas; monomials and polynomials; ratio and proportion variables; and square roots and radicals.

Geometry: Calculate plane and solid figures; circumference, area, and volume. Understand kinds of angles, and properties of pairs of angles.

Computes wages and posts wage data to payroll records. Computes earnings from time sheets and work tickets, using calculator. Operates posting machine to compute and subtract deductions, such as income tax withholdings, social security payments, and insurance.

Rents automobiles to customers at hotels and transportation stations. Computes cost of rental, based on per-day and per-mile rates.

Receives cash from customers in payment for goods or services and records amounts received. Computes bill, itemized lists, and tickets showing amount due, using adding machine or cash register. Makes change and cashes checks.

Measures tensile strength, hardness, ductility, or other physical properties of metal specimens, on various types of testing machines. Calculates values, such as unit tensile strength and percentage elongation.

Controls purification unit to remove impurities such as moisture and oxygen from helium gas used in balloons. Calculates amounts of gas transferred, using slide rule.

Level 4

Algebra: Deal with system of real numbers; linear, quadratic, rational, exponential, logarithmic, angle and circular functions, and inverse functions; related algebraic solution of equations and inequalities; limits and continuity, and probability and statistical inference.

Geometry: Deductive axiomatic geometry, plane and solid; and rectangular coordinates.

Shop Math: Practical application of fractions, percentages, ratio and proportion, mensuration, logarithms, slide rule, practical algebra, geometric constructions, and essentials of trigonometry.

Inspects flat glass and compiles defect data based on samples to determine variances from acceptable quality limits. Calculates standard control tolerances for flat glass, using algebraic formulas, plotting curves, and drawing graphs.

Keeps records of financial transactions of establishment. Balances books and compiles reports to show statistics, such as cash receipts and expenditures, accounts payable and receivable, profit and loss, and other items pertinent to operation of business.

Calculates tonnage and prepares tonnage report of ship's cargo for assessment of port traffic. Converts metric measurements of foreign manifests into pounds and cubic feet, using formulas and calculating machine.

Lays out and cuts plastic patterns used for pantograph engraving according to sketches or blueprints, using drafting instruments and engraving tools. Establishes reference points on plastic sheet and computes layout dimensions, following blueprints.

Surveys earth's surface using surveying instruments and oversees engineering survey party engaged in determining exact location and measurements of points, elevations, lines, areas, and contours of earth's surface to secure data used for construction, mapmaking, land valuation, mining, or other purposes. Verifies by calculations accuracy of survey data secured.

Level 5

Algebra: Work with exponents and logarithms, linear equations, quadratic equations, mathematical induction and binomial theorem, and permutations.

Calculus: Apply concepts of analytic geometry, differentiation and integration of algebraic functions with applications.

Statistics: Apply mathematical operations to frequency distributions, reliability and validity of tests, normal curve, analysis of variance, correlation techniques, chi-square application and sampling theory, and factor analysis.

Plans survey, and collects, organizes, interprets, summarizes, and analyzes numerical data on sampling or complete enumeration bases. Evaluates reliability of sources of data, adjusts and weighs raw data, and organizes and summarizes data into tabular forms amenable to analysis of variance and principles of statistical inference.

Develops, fabricates, assembles, calibrates, and tests electronic systems and components used in aircraft, and missile production and testing operations. Establishes circuit layout dimensions, by mathematical calculations and principles.

Applies knowledge of mathematics, probability, statistics, principles of finance and business to problems in life and health insurance, annuities, and pensions. Constructs probability tables regarding fire, natural disasters, and unemployment, based on analysis of statistical data and other pertinent information.

Applies principles of accounting to install and maintain general accounting system. Designs new system or modifies existing system to provide records of assets, liabilities, and financial transactions of establishment.

Plans, designs, conducts, and analyzes results of experiments to study problems in human and animal behavior. Analyzes test results, using statistical techniques, and evaluates significance of data in relation to original hypothesis.

Level 6

Advanced Calculus: Work with limits, continuity, real number systems, mean value theorems, and implicit function theorems.

Modern Algebra: Apply fundamental concepts of theories of groups, rings, and fields. Work with differential equations, linear algebra, infinite series, advanced operational methods and functions of real and complex variables.

Statistics: Work with mathematical statistics, mathematical probability and application, experimental design, statistical inference, and econometrics.

Conducts and oversees analyses of aerodynamic and thermodynamic systems and aerophysics problems to determine suitability of design for aircraft and missiles. Establishes computational procedures for and methods of analysing problems.

Analyzes physical systems, formulates mathematical models of systems, and sets up and operates analog computer to solve scientific and engineering problems. Prepares mathematical model of problem, applying principles of advanced calculus and differential equations.

Observes and interprets celestial phenomena and relates research to basic scientific knowledge or to practical problems such as navigation. Determines mathematically sizes, shapes, brightness, spectra, motions, and positions of sun, moon, planets, stars, nebulas, and galaxies.

Conducts research in fundamental mathematics and solves or directs solutions to problems in research, development, production, and other activities by mathematical methods. Conceives and develops ideas for application of mathematics such as algebra, geometry, number theory, logic, and topology.

Conducts research into phases of physical phenomena, develops theories and laws on basis of observation and experiments, and devises methods to apply laws and theory of physics to industry, medicine, and other fields. Describes and expresses observations and conclusions in mathematical terms.

LANGUAGE DEVELOPMENT

Level 1

Reading: Recognize meaning of 2,500 (two and three syllable) words.
Read at rate of 95–120 words per minute.
Compare similarities and differences between words and between series of numbers.

Writing: Print simple sentences containing subject, verb, and object, series of numbers, names, and addresses.

Speaking: Speak simple sentences, using normal word order and present and past tenses.

Delivers telephone directories to residence and business establishments, following oral instructions or address list.

Obtains reels of motion picture film from stock as specified on shipping order. Wraps paper band bearing film identification around each reel, ties reels with string, and sets them aside for shipment.

Pastes labels and tax stamps on filled whiskey bottles passing on conveyor. Looks at bottles to ascertain that labels and stamps have been correctly applied. Packs whiskey bottles in cartons. Pastes identification labels onto cartons.

Packs small arms ammunition in bandoleer belt pockets. Compares ammunition identification data stenciled on belt with work order to insure packing of correct caliber cartridges. Places cardboard separator between two filled ammunition clips and slides them into cardboard packet.

Level 2

Reading: Passive vocabulary of 5–6,000 words.
Read at rate of 190–215 words per minute.
Read adventure stories and comic books, looking up unfamiliar words in dictionary for meaning, spelling, and pronunciation.
Read instructions for assembling model cars and airplanes.

Writing: Write compound and complex sentences, using cursive style, proper end punctuation, and employing adjectives and adverbs.

Speaking: Speak clearly and distinctly with appropriate pauses and emphasis, correct pronunciation, variation in word order, using present, perfect, and future tenses.

Announces availability of seats and starting time of show. Answers such questions as length of performances, coming attractions, and locations of telephones or restrooms.

Delivers messages, documents, packages, and other items to offices or departments within establishment.

Tends machines and equipment that grind, mix, form, and cook raw fish to make fishcakes. Places paste in mixing machine and adds specified amounts of flour, water, and spices.

Fills requisitions, work orders, or requests for materials, tools, or other stock items. Prepares and attaches shipping tags to containers. Keeps records of materials or items received or distributed.

Serves food to patrons at counters and tables of coffee shops, lunchrooms, and other dining establishments. Presents menu, answers questions, and makes suggestions regarding food and services.

Level 3

Reading: Read a variety of novels, magazines, atlases, and encyclopedias.
Read safety rules, instructions in the use and maintenance of shop tools and equipment, and methods and procedures in mechanical drawing and layout work.

Writing: Write reports and essays with proper format, punctuation, spelling, and grammar, using all parts of speech.

Speaking: Speak before audience with poise, voice control, and confidence, using correct English and well-modulated voice.

Types letters, reports, stencils, forms, addresses, or straight-copy materials from rough draft or corrected copy. Files correspondence, cards, invoices, receipts, and other records in alphabetical or numerical order, or according to subject matter, phonetic spelling, or some other system.

Renders personal service to railroad passengers to make their trip pleasant and comfortable. Greets passengers and answers questions about train schedules, travel routes, and railway services.

Keeps records of products returned to manufacturer to credit customer's account, to replace damaged merchandise, or to file damage claims. Verifies incoming items against bills of lading. Prepares routing and shipping forms on outgoing items.

Drives truck over established route to deliver, sell, and display products or render services. Calls on prospective customers to solicit new business. Writes delivery orders.

Services automobiles, buses, trucks, and other automotive vehicles with fuel, lubricants, and accessories. Prepares daily report of fuel, oil, and accessories sold. Answers customers' questions regarding location of streets and highways, points of interest, and recreational areas.

Level 4

Reading: Read novels, poems, newspapers, periodicals, journals, manuals, dictionaries, thesauruses, and encyclopedias.

Writing: Prepare business letters, expositions, summaries, and reports, using prescribed format and conforming to all rules of punctuation, grammar, diction, and style.

Speaking: Participate in panel discussions, dramatizations, and debates.
Speak extemporaneously on a variety of subjects.

Composes letters in reply to correspondence concerning such items as requests for merchandise, damage claims, credit information, delinquent accounts, or to request information. Reads incoming correspondence, types or dictates reply, or selects and completes form letters.

Interviews applicants to obtain such information as age, marital status, work experience, education, training, and occupational interest.

Compiles lists of prospective customers to provide leads to sell insurance. Contacts prospective customers, explains features of policies, and recommends amount and type of coverage, based on analyses of prospects' circumstances.

Inspects and tests storage batteries in process of manufacture to verify conformity with specifications. Records inspection and test results, compares them with specifications, and writes reports for use in correcting manufacturing defects.

Repairs and overhauls automobiles, buses, trucks, and other automotive vehicles. Reads technical manuals and other instructional materials.

Level 5

Reading: Read literature, book and play reviews, scientific and technical journals, abstracts, financial reports, and legal documents.

Writing: Write novels, plays, editorials, journals, speeches, manuals, critiques, poetry, and songs.

Speaking: Conversant in the theory, principles, and methods of effective and persuasive speaking, voice and diction, phonetics, and discussion and debate.

Introduces various types of radio and television programs, interviews guests, and acts as master of ceremonies. Describes public events, such as parades and conventions, and reads news flashes and advertising copies during broadcasts.

Instructs students in techniques of public speaking and oral reading to develop effective speech and delivery in them. Teaches enunciation of words, intonation, gestures, and other disciplines of voice and delivery.

Collects and analyzes facts about newsworthy events by interview, investigation, or observation, and writes newspaper stories that conform to prescribed editorial techniques and format. Interviews persons and observes events and writes story, referring to reference books, newspaper files, or other authoritative sources to secure additional relevant facts.

Writes service manuals and related technical publications concerned with installation, operation and maintenance of electronic, electrical, mechanical and other equipment. Interviews workers to acquire or verify technical knowledge of subject. Rewrites articles, bulletins, manuals, or similar publications.

Assists legal representatives in preparation of written contracts covering other than standardized agreements. Reviews agreement for conformity to company rates, rules, and regulations. Writes agreement in contractual form and obtains necessary legal department approval.

Level 6

(Same as Level 5)[3]

Directs editorial activities of newspaper and negotiates with production, advertising, and circulation department heads. Confers with editorial policy committee and negotiates with department heads to establish policies and reach decisions affecting publications. Writes leading or policy editorials on specific public issues.

---

[3] The diversity of language courses offered at the college level precludes distinguishing the two top levels of language development from each other by specific definitions. Instead, the college levels are characterized as a continuum, during which time language content remains the same but is progressively refined or specialized. Therefore, Levels 5 and 6 of language development share the same definition. Level 6 represents more advanced development of the definition content.

Plans, organizes, and conducts research for use in understanding social problems and for planning and carrying out social welfare programs. Constructs and tests methods of data collection. Collects, analyzes, and evaluates data. Writes reports containing descriptive, analytical and evaluative content, interprets methods employed, and submits findings to individuals within agency and community.

Conducts and oversees analyses of aerodynamic and thermodynamic systems and aerophysics problems to determine suitability of design for aircraft and missiles. Evaluates test data and interprets established data to others. Prepares reports covering such subjects as powerplant installation, thermal ice protection, air conditioning, pressurization, and heat transfer.

Advises corporations concerning legal rights, obligations, and privileges. Studies Constitution, statutes, decisions, and ordinances. Examines legal data to determine advisability of defending or prosecuting lawsuit.

Teaches one or more subjects, such as economics, chemistry, law, or medicine, within a prescribed curriculum. Prepares and delivers lectures to students. Reviews current literature in field of study. Writes articles for publication in professional journals.

Scale of Specific Vocational Preparation (SVP)

Level	*Time*[4]
1	Short demonstration only
2	Anything beyond short demonstration up to and including 30 days
3	Over 30 days up to and including 3 months
4	Over 3 months up to and including 6 months
5	Over 6 months up to and including 1 year
6	Over 1 year up to and including 2 years
7	Over 2 years up to and including 4 years
8	Over 4 years up to and including 10 years
9	Over 10 years

Definitions and Illustrative Situations for SVP Levels

Level 1

Short demonstration only

Inserts corrected typed word in copy prior to photostating. Cuts out misspelled words, using razor. Fastens corrected word to tape and inserts in cutout area.

Feeds eggs into machine that removes earth, straw, and other residue from egg surface prior to shipment. Places eggs in holder that carries them into machine for washing. Removes cleaned eggs from discharge trough and packs them in cases.

Plants seedling in predetermined forest areas. Carries plants wrapped in wet moss and digs holes of prescribed size, using mattock. Places seedling in hole and tamps dirt around plant with foot. Paces off specified distance to next site and repeats planting process.

Feeds cylindrical stock into one or more threading machines. Shovels, dumps, or inserts material in hopper or feedback of machine that automatically threads stock. Carries or wheels filled and empty containers to and from machine.

Examines paper winding on reel for defects, such as spots, holes, and wrinkles, and inserts strip of paper in roll to flag defects for removal at cutting and rewinding machine.

Assists operator in winding unfinished cloth into skeins by feeding and offbearing reeling machine. Lifts end of cloth roll and mounts roll in box or bar of reeling machine. Observes cloth being wound and guides it into even skeins on reel.

---

[4] Time spent in general educational development is not considered in estimating specific vocational preparation.

Fills glasses with tap beer and hands them to waiters who serve patrons. Inserts taps in unopened barrels.

Sets up pins in bowling alley and returns thrown balls to customer. Spots pins on pegs in floor or places them in rack which lowers pins into position. Returns balls to players by rolling them along inclined runway.

Feeds farm products, such as stripped hop vines, hay, and corn stalks into machine that chops them and blows them into storage bin or silo. Pitches material onto feed conveyors. Rakes up spilled material.

Weighs and records weight of materials such as cotton, sugarcane, paper, and tobacco to keep production, receiving, or other records. Reads dial to ascertain weight of object and records weight on ticket or material, or inserts ticket into automatic recorder that prints weight on ticket.

Level 2

Anything beyond short demonstration up to and including 30 days

Obtains credit information, such as status of installments accounts, on individuals from credit departments of business and service establishments, using telephone. Copies information onto form to provide current information for credit record on file.

Selects talking books for mailing to blind library patrons. Compares borrower's written request with list of available titles. Selects books, following borrower's request, or selects substitute titles, following such criteria as age, education, and interest of borrower.

Changes bills or coins of large denomination into smaller units for convenience of patrons at places of amusement, such as penny arcades, carnivals, and gambling establishments. Cashes checks that are endorsed and approved by management.

Lifts green-clay products, such as brick, roofing tile, or quarry floor tile from press-conveyor belt, and stacks them in specified pattern on kilncar, drier rack, or pallet.

Poses as subject for paintings, sculptures, and other types of art for translation into plastic or pictorial values by painter or sculptor.

Trims fat, skin, tendons, tissues, and ragged edges from meat cuts, such as loins, hams, sirloins, and chops, using meathook and knife. Trims fatback from hog bellies and cuts bellies into specified shapes, using knife. Trims meat and fat from bones and places trimmings and bones in separate containers.

Assists patrons at entertainment events in finding seats, searching for lost articles, and locating such facilities as restrooms and telephones. Distributes programs to patrons.

Drives cars between parking lot and entrance to restaurant, department store, or other establishment rendering parking service to patrons.

Tests blood of poultry to ascertain presence of pullorum disease. Pricks vein in bird's wing, using needle. Collects blood on wire loop and drops blood into pullorum reactor. Examines blood for specks that indicate presence of pullorum disease.

Dips metal parts into molten solder to bond them together, using any combination of following methods: (1) twists, crimps, or holds parts together and dips them in solder for specified time; (2) dips parts separately and solders them together, using soldering iron; (3) clamps workpiece onto fixture and depresses lever to lower workpiece into solder pot.

Level 3

Over 30 days up to and including 3 months

Attaches tickets to cut garment parts to identify parts cut from same layer of cloth and to identify parts that match in shade for assembly into one garment. Staples tickets to parts, using hand stapler. Positions ticket and garment part under head of stapling machine and depresses pedal of machine that staples ticket to part.

Drives truck over established route to collect coins and refill vending machines. Loads truck with supplies according to written or verbal instructions. Drives truck to establishment, collects coins, refills machine, and records amount of money collected. Reports malfunctioning machines to maintenance department for repairs.

Cares for animals under treatment in animal hospital for disease, injury, or for production of serums. Sterilizes surgical instruments and other equipment, such as rubber gloves and syringes, using germicides and autoclave. Administers anesthetic and medications under direction of veterinarian. Bathes and brushes animals and clips their hair and nails.

Attends to personal needs of handicapped children in school to receive specialized academic and physical training. Wheels handicapped children to classes, lunchrooms, and treatment rooms. Prepares children for physical therapy treatment; secures them in equipment, and lowers them into baths or pools, using hoists. Helps children to walk, board buses, put on braces, eat, dress, and perform other physical activities.

Receives articles, such as shoes and clothing, to be repaired or cleaned, in personal service establishment. Quotes prices and prepares work ticket. Sends articles to work department. Returns finished articles to customer and collects amount due.

Tends a variety of machine tools, such as lathes, drill presses, or milling machines to machine metal workpieces according to production specifications. Positions workpiece in fixture, or loads automatic feeding device. Starts machine, engages feed, and observes operation. Verifies conformance of machined workpieces to specifications, using fixed gages, calipers, or micrometer.

Examines hairsprings for flatness and concentricity, using tweezers and loupe. Stretches spring to be sure it lies in one plane, spacing is uniform between coils, and spring is free from blemishes.

Plants, cultivates, and harvests trees, shrubs, and ornamental flowering plants in nursery. Mixes soil with other materials, such as sand and peat moss, to prepare plant beds, and plants specified seeds, seedlings, or bulbs. Fumigates plants to kill insect pests. Grafts buds onto trees of different varieties as directed.

Interviews applicants for employment and processes application forms. Interviews applicants to obtain information, such as age, work experience, education, and occupational interest. Refers qualified applicants to employing official. Writes letters to references indicated on application or telephone agencies, such as credit bureaus and finance companies.

Types letters, reports, stencils, forms, addresses, or other straight copy materials from rough draft or corrected copy.

Level 4

Over 3 months up to and including 6 months

Verifies accuracy of loan applications and prepares file for each loan transaction. Compares original application with credit report. Approves loan and prepares check. Prepares loan worksheet, insurance record, credit report, and application copy for each loan.

Operates machine to reproduce data or ruled forms on paper from type in flat impression bed or plates on revolving cylinder. Selects type or embossed plate and sets it up on cylinder of flat bed of machine. Loads paper in feed tray and makes adjustments to parts, such as inking rolls or ribbon and feeding mechanism. Starts machine which automatically pushes sheets under revolving cylinder or against flat impression bed of type where paper is printed.

Assists in care of hospital patients, under direction of nursing and medical staff. Bathes, dresses, and undresses patients. Transports patients to treatment units, using wheelchair, or asissts them to walk. Drapes patients for examinations and treatments, and performs such duties as holding instruments and adjusting lights. Takes and records temperature, pulse, and respiration rates, and food and liquid intake and output as directed.

Tends one or more machines that wash commercial, industrial, or household articles, such as garments, blankets, curtains, draperies, fine linens, and rags. Loads, or directs workers in loading machine with articles requiring identical treatment. Starts machine and turns valves to admit specified amounts of water, soap, detergent, bluing, and bleach. Guards inmates in penal institution in accordance with established policies, regulations, and procedures. Observes conduct and behavior of inmates to prevent disturbances and escapes. Inspects locks, window bars, grills, doors, and gates for signs of tampering. Guards and directs inmates during work assignments.

Controls furnace to relieve internal stresses in metal objects and to soften and refine grain structure. Charges objects directly onto furnace bed or packs them into boxes or tubes sealed with clay to prevent oxidation. Reduces heat and allows objects to cool in furnace or removes objects from furnace and allows them to cool in open air.

Drives gasoline or diesel powered tractor-trailer combination, usually over long distances, to transport and deliver goods, livestock, or materials in liquid, loose, or packaged form. Inspects and makes out reports on truck condition before and after trips.

Installs circuit wiring in automobiles, truck trailers, and mobile homes for lights, ignition, and other electrical apparatus, following diagrams and color code. Cuts and locates openings in walls and ceiling for wire, light fixtures, outlet boxes, and fuse holders, using electric drill and router. Threads wires or cables through holes and secures them to frame. Installs fixtures and boxes. Connects terminals to power source to test operation of fixtures.

Pours liquid candy into chilled molds to form solid candy figures. Dumps or pours candy into warming pan and turns dial to heat product to pouring temperature. Stirs candy to facilitate melting and pours it into chilled mold.

Patrols assigned beat on foot, using motorcycle or patrol car, or on horseback to control traffic, prevent crime or disturbance of peace, and arrest violators. Disperses unruly crowds at public gatherings. Reports to scene of accidents, renders first aid to injured, and investigates causes and results of accident. Inspects public establishments requiring licenses to insure compliance with rules and regulations. Issues tickets to traffic violators. Directs and routes traffic.

Level 5

Over 6 months up to and including 1 year

Performs routine tests in medical laboratory for use in treatment and diagnosis of disease. Prepares tissue samples for pathologist, takes blood samples, and prepares vaccines. Carries out such laboratory tests as urinalyses and blood counts using microscopes, micrometers, and similar instruments. Makes quantitative and qualitative chemical and biological analyses of body specimens under supervision of medical technologist or pathologist.

Performs assigned duties in business organization, depending on nature of business, to gain knowledge and experience for promotion to management positions. Participates in work of such departments of business as credit, sales, engineering, advertising, accounting, traffic, warehousing, or personnel, performing various duties under close supervision. Observes techniques utilized by experienced workers, learns line and staff functions of each department, and becomes familiar with management policies and viewpoints as they affect each phase of business operations.

Takes dictation in shorthand of correspondence, reports, and other matter, and transcribes dictated material, using typewriter. Performs a variety of clerical duties, such as tabulating and posting data in record books, and preparing, issuing, and sending out receipts, bills, invoices, and checks, or works in a stenographic pool transcribing material from sound recordings.

Receives, stores, and issues supplies and equipment and compiles records of supply transactions aboard ship. Verifies that supplies received are listed on requisitions and invoices. Stores, issues, and inventories supplies and equipment. Compiles report of expenditures.

Sells men's furnishings, such as neckties, shirts, belts, hats, and accessories. Advises customer on coordination of accessories.

Operates barrel plating equipment to coat metal objects electrically with metal to build up, protect, or decorate surfaces. Places metal objects in mesh container and immerses them in cleaning solution. Places objects in perforated barrel, turns handle to lower barrel into plating solution and to close electrical contacts. Starts flow of electric current through plating solution, causing plating metal at anode to decompose and be deposited on objects in barrel.

Controls equipment to bleach pulp. Starts pump and adjusts controls to regulate flow of pulp to absorption towers, bleaching and soaking tanks, and pulp washers, according to specified bleaching sequence. Opens valves to allow metered flow of such chemicals as liquid and gaseous chlorine, caustic soda, and peroxide into pulp. Starts agitators to mix pulp and chemicals. Adjusts controls to insure that pulp bleaching meets specifications, following laboratory test reports.

Assembles and adjusts typewriters and office machines or subassemblies, using handtools and holding devices. Screws and bolts parts together, using screwdrivers, wrenches, and other handtools. Tests operation of machines and typewriters to detect loose and binding parts and to determine synchronization of related parts. Verifies tensions and clearances of parts, using tension scales, and space and feeler gages.

Performs any combination of the following duties on construction projects, usually working in utility capacity, by transferring from one task where demands require worker with varied experience and ability to work without close supervision: Measures distances from grade stakes and drives stakes, stretches tight line, and positions and blocks up under forms. Mixes concrete, using portable concrete mixer. Gives direction to workers engaged in dumping concrete into forms. Erects shoring and braces. Aids construction equipment operators to aline and move equipment, such as cranes, power shovels, and back hoes, by verifying grades and signaling operators to adjust machines to conform to grade specifications.

Coats, decorates, glazes, retouches, or tints articles, such as fishing lures, toys, dolls, pottery, artificial flowers, greeting cards, and household appliances, using airbrush. Stirs or shakes coating liquid and thinner to mix them to specified consistency. Pours liquid into airbrush container, couples spray gun to airhose, and starts compressor. Turns adjusting sleeve on nozzle of spray gun to regulate spray pattern and presses button on airbrush to spray coating over workpiece or to spray specified designs and decorations on workpiece.

Level 6

Over 1 year up to and including 2 years

Performs dental prophylactic treatments and instructs groups and individuals in care of teeth and mouth. Removes calcareous deposits, accretions, and stains from teeth by scraping accumulation of tartar from teeth and beneath margins of gums, by using rotating brush, rubber cup, and cleaning compounds. Charts conditions of decay and disease for diagnosis and treatment by dentist. Lectures community organizations and other interested groups regarding oral hygiene, using motion pictures, charts, and other visual aids.

Keeps records of financial transactions of establishment. Verifies and enters details of transactions in account and cash journals from items, such as sales slips, invoices, check stubs, inventory records, and requisitions. Balances books and compiles reports to show statistics, such as cash receipts and expenditures, accounts payable and receivable, profit and loss, and other items. Calculates employee wages from plant records or timecards and makes up checks or withdraws cash from bank for payment of wages.

Sells insurance to new and present clients, recommending amount and type of coverage, based on analysis of prospect's circumstances. Compiles lists of prospective clients to provide leads most likely to produce additional business. Explains features of policies offered. Calculates rates to be applied to policy for each prospect, using rate books.

Identifies stains in wool, synthetic, and silk garments and household fabrics and applies chemical solutions to remove them, determining spotting procedures on basis of type of fabric and nature of stain. Sprinkles chemical solvents over stain and pats area with brush or sponge until stain is removed.

Sprays steam, water, or air over spot to flush out chemicals and dry garment.

Controls still, from central control board, to distill brandy, gin, or whiskey. Adjusts valves to control temperature and rate of flow of distilling materials through still and auxiliary equipment, such as stripping column, rectifier, condenser, and tribox. Observes gages, dials, and charts to insure that temperature and rate of flow of distillants are maintained according to formula. Determines proof of distilled liquor by ascertaining temperature and specific gravity of liquor, using thermometer and hydrometer.

Inspects wool to sort and grade it according to length of fiber, color, and degree of fineness, utilizing sight, touch, experience, and established specifications. Shakes fleece over screen-topped table to remove dust. Picks out foreign matter, such as burrs, sticks, strings, and cinders. Breaks fleece into pieces and inspects and sorts them according to quality.

Sets up and operates two or more types of machine tools, such as lathes, milling machines, boring machine, and grinders to machine metal workpieces according to specifications, tooling instructions, standard charts, applying knowledge of machining methods. Reads blueprint or job order for product specifications, such as dimensions and tolerances, and tooling instructions, such as fixtures, feed rates, cutting speeds, depth of cut, and cutting tools to be used. Positions tool in toolholder. Moves controls to position tool and workpiece and to set specified feeds, speeds, and depth of cut. Starts machine. Observes operation and verifies conformance of machined workpiece to specifications, using measuring instruments, such as fixed gages, calipers, and micrometers.

Arranges layout of work stations on assembly line, following written specifications and oral instructions, to prepare line for production of electronic components, such as printed circuit boards, transformer assemblies, and wiring harness and cables. Reads specifications including lists of materials and wiring diagrams to requisition equipment, such as piece parts, tools, test instruments, jigs, and fixtures for work stations. Positions equipment in specified arrangement at work stations.

Cuts, shapes, and polishes precious and synthetic gems. Positions rough stone in holder and holds stone against edge of revolving saw or lapidary slitter impregnated with diamond dust to cut and slit stone. Selects shaping wheel and applies abrasive compound. Holds lapidary stick against revolving shaping wheel and lapidary disk to shape stone and grind facets.

Alters women's ready-to-wear garments as instructed. Rips stitches from darts and seams of section to be altered. Operates sewing machine to sew ripped sections to customer's measurements. Sews sections of garment, such as hem, sleeve, or lining, using needle and thread.

Level 7

Over 2 years up to and including 4 years

Plans artistic architectural and structural features of any class of buildings and like structures. Sketches designs and details, using drawing instruments. Makes engineering computations involved in the strength of material, beams, and trusses. Estimates quantities needed for project and computes cost.

Applies electronic theory, principles of electrical circuits, electrical testing procedures, engineering mathematics, physics, and related subjects to lay out, build, test, trouble shoot, repair, and modify developmental production and production electronic equipment, such as computers, missile-control instrumentation, and machine tool numerical controls. Assembles experimental circuitry or complete prototype model according to engineering instructions, technical manuals, and knowledge of electronic systems and components and their function. Writes technical reports and develops charts, graphs, and schematics for use by engineers in evaluating system.

Supervises and coordinates activities of clerical staff of an establishment. Prepares work schedules and expedites workflow. Reviews work performed, prepares employee ratings, and conducts employee benefit and insurance programs. Computes and compiles data and prepares records and reports. Studies and standardizes procedures to improve efficiency of department. Coordinates work operations of other departments. Estimates budget needs.

Commands ship to transport passengers, freight, and other cargo across oceans, bays, lakes, and in coastal waters. Sets course of ship, using navigational aids, such as charts, area plotting sheets, compass, and sextant. Determines geographical position of ship by use of loran or azimuths of celestial bodies. Calculates landfall by use of electronic sounding devices and by following contour lines on chart. Coordinates activities of crew members.

Supervises and coordinates activities of pantry, storeroom, and noncooking kitchen workers, and purchases or requisitions foodstuffs, kitchen supplies, and equipment. Inspects kitchens and storerooms to insure that premises and equipment are clean and in order, and that sufficient foodstuffs and supplies are on hand to insure efficient service. Examines incoming purchases for quality. Coordinates activities of cleaning personnel and storage and supply workers.

Operates control panel to regulate temperature, pressure, rate of flow, and tank level in petroleum refining, processing, and treating units and petro-chemical units, according to process schedules. Observes instruments and meters to verify specified conditions and records reading. Moves and adjusts dials, switches, valves, and levers on control panel to regulate and coordinate process variable, such as flow, temperature, pressures, and chemicals as specified. Records results of laboratory analysis.

Installs and repairs gas meters, regulators, ranges, heaters, and refrigerators in customer's establishment, using manometers, voltmeter, handtools, and pipe-threading tools. Measures, cuts, and threads pipe and connects it to feeder line and equipment or appliance. Tests and examines pipelines and equipment to locate leaks and faulty pipe connections and to determine pressure and flow of gas. Dismantles meters and regulators, and replaces defective pipes, thermocouples, thermostats, valves, and indicator spindles, using handtools.

Repairs or replaces upholdstery in automobiles, buses, and trucks. Removes old upholstery from seats and door panels of vehicle. Measures new padding and covering materials, and cuts them to required dimensions. Adjusts or replaces seat springs and ties them in place. Sews covering material together, using sewing machine. Fits covering to seat frame. Repairs or replaces convertible tops.

Assembles, plants, and detonates charges of industrial explosives to loosen earth, rock, stumps, or to demolish structures facilitating removal. Examines mass, composition, structure, and location of object to be blasted, estimates amount and determines kind of explosive to be used. Assembles primer and places it with main charge in hole or near object to be blasted. Gives signal to clear area, and detonates charge.

Develops exposed photographic film or sensitized paper in series of chemical and water baths to produce negative or positive prints. Mixes developing and fixing solutions, following formula. Immerses exposed film or photographic paper in developer solution to bring out latent image. Immerses negative or paper in stop-bath to arrest developer action, in hypo-solution to fix image, and in water to remove chemicals.

Level 8

Over 4 years up to and including 10 years

Conducts experiments on substances to develop and improve materials and products and to discover scientific facts. Combines organic compounds to make new substances or to duplicate substances found in nature. Carries out and participates in experiments designed to develop and improve, by chemical means, color, texture and strength, and lasting qualities of paint, rubber, wood, dye, petroleum, and other organic compounds and by-products. Develops new uses for chemical by-products, and devises new procedures for preparing organic compounds.

Directs, coordinates, and participates in motion picture art work production concerned with design of sets, scenic effects, and costumes. Plans costuming of cast. Refers to technical literature to insure that scenes and costumes depict accurate representation of given period or location. Coordinates efforts of departments to achieve harmonious color effects in production of color films.

Manages farm concerned with raising, harvesting, packing, and marketing farm products for corporations, cooperatives, and other owners. Analyzes market conditions to determine acreage allocations. Negotiates with bank officials to obtain credit from bank. Purchases farm machinery and equipment. Prepares financial and other management reports. Confers with purchasers, and determines when and under what conditions to sell products.

Supervises and coordinates activities of cooks engaged in the preparation of desserts, pastries, confections, and ice cream. Plans production for pastry department, according to menu or special requirements. Supplies recipes for and suggests methods and procedures to pastry workers. Fashions table and pastry decorations, such as statuaries and ornaments, from sugar paste and icings.

Supervises and coordinates activities of workers engaged in operation of blast furnace to produce molten pig iron. Directs workers in charging furnace with specified amounts of raw materials, such as iron ore, coke, and limestone. Observes color of molten metal through tuyeres, or reads pyrometer and orders changes in furnace temperature and pressure. Estimates amounts of ferrosilicon, manganese, and phosphorous to add to molten metal to obtain specified type of pig iron.

Inspects, tests, and adjusts new and reworked tools, dies, gages, jigs, and fixtures, for conformance to specifications, such as dimensions, tolerances, and hardness. Computes angles, radii, and other dimensions, using algebra, geometry, and trigonometry. Lays out center lines and reference points on parts. Measures angular dimensions, radii contours, clearances, thread lead, and other specifications, using precision measuring instruments.

Constructs and repairs dental appliances, according to dentist's prescription. Fabricates full and partial dentures, using wax and plaster models, surveyors, tooth-color scales, articulators, and electric grinders and polishers. Constructs crowns, inlays, and wire frames by forming gold and platinum wire, or by casting in mold in centrifugal casting furnace. Constructs porcelain teeth from impression, using powdered porcelain and water, electric furnaces, grinding wheels, and tooth-color scales.

Repairs and maintains electrical equipment in generating station or powerhouse. Tests defective equipment to determine cause of malfunction or failure, using voltmeters, ammeters, and related electrical testing apparatus. Repairs and replaces equipment, such as relays, switches, supervisory controls, and indicating and recording instruments. Tests and repairs switchboard and equipment circuitry, interpreting wiring diagrams to trace and connect numerous wires carrying current for independent functions.

Prepares flight schedules for airline. Reviews schedules and travel loads and determines need for schedule revision. Prepares advance schedules in accordance with known and estimated passenger travel patterns between designated points, and availability of equipment. Studies company and interline schedules to coordinate flights and devise schedule patterns. Prepares request for route use, as directed by Schedule Committee and assembles supporting material based on analysis of passenger loads and travel patterns.

Manages industrial organization. Determines and executes administrative policies through subordinate managers. Coordinates activities of departments, such as production, distribution, engineering, maintenance, personnel, and selling. Plans and directs marketing of product to develop new markets and maintain sales volume and competitive position in industry.

Level 9

Over 10 years

Supervises and coordinates activities of workers engaged in installation, maintenance, repair, servicing, enlargement, and relocation of water distribution and sewage facilities. Analyzes trends, such as population and industrial growth of area serviced to determine adequacy of current facilities, and to forecast future community demands for water and sewage facilities. Designs plans to meet and serve expanding community needs. Confers with administrative and technical personnel to coordinate departmental activities with organizational demands.

Provides leadership for professional staff and participates in development of academic policy and programs of college or university. Supervises department or division chairmen or deans of individual colleges. Determines scheduling of courses and recommends implementation of additional courses. Advises students on choice of major academic area, and coordinates academic advising efforts of deans of colleges and faculty. Participates in activities of faculty comittees, such as curriculum committee and faculty personnel committee.

Administers affairs of museum and conducts scientific research programs. Directs activities concerned with instructional, research, and public service objectives of institutions. Obtains, develops, and organizes new collections to build up and improve educational and research facilities. Organizes and conducts field parties engaged in scientific research, performing duties such as gathering scientific papers, selecting personnel, and securing financial support for expeditions.

Directs editorial activities of newspaper and negotiates with production advertising, and circulation department heads. Appoints editorial heads and supervises work of their department in accordance with newspaper policy. Writes leading or policy editorials. Confers with editorial policy committee and negotiates with production, circulation and advertising department heads to establish policies and reach decisions affecting publication.

Creates and writes musical compositions. Invents melodic, harmonic, and rhythmic structures to express ideas musically within circumscribed musical form, such as symphony, sonata, or opera. Translates melodies, harmonies, and rhythms into musical notes and records notes on scored music paper.

Directs engineering departments of petroleum production or pipeline company and advises management on engineering problems. Reviews engineering designs for neatness and accuracy. Directs engineering personnel in formulating plans, designs, cost estimates, and specifications for oilfield or pipeline construction, maintenance, and modernization programs. Supervises engineering office workers computing budgets, compiling reports, and conducting special investigations and studies to evaluate efficiency of engineering programs

Administers private, corporate, and probate trusts. Examines or drafts trust agreement to insure compliance with legal requirements and terms creating trust. Locates, inventories, and evaluates assets of probated accounts. Directs realization of assets, liquidation of liabilities, payment of bills, preparation of Federal and State tax returns, and collection of earnings.

Directs and coordinates activities of municipal police department in accordance with authority delegated by board of police. Promulgates rules and regulations for department. Coordinates and administers daily police activities through subordinates. Directs activities of personnel engaged in preparing budget proposals, maintaining police records, and recruiting men.

Plans, administers, and directs intercollegiate athletic activities in college or university. Interprets and participates in formulating extramural athletic policies. Directs athletic coaches and members of coaching staff. Prepares budget estimates. Assumes immediate responsibilities for receipts and expenditures of department, and for production of income, such as scheduling sports events, and controlling and managing ticket sales.

Develops and administers policies of organization in accordance with corporation character. Establishes operating objectives and policies for firm. Reviews progress and makes necessary changes in company plans. Directs preparation of major financial programs, such as pricing policies and salary and wage schedules, to insure operating efficiency and adequate investment and dividend returns.

Procedures for Evaluating and Recording Training Time Requirements

In evaluating jobs for training time, the questions that must be answered are:

(1) What level of general educational development is required for a worker to acquire the background knowledge and to follow the instructions in the specific job-worker situations?

(2) How long in terms of specific vocational preparation does it take for a worker of specified general educational development to become a fully qualified worker, in contrast to a trainee, in this job?

Evaluate the job tasks in terms of the three categories of the GED scale. After determining the level required in each category, select the highest to express the GED for the job. Circle the selected GED numerical level under Item 6 of the Job Analysis Schedule.

Estimate the time required for the worker, taking the usual training available, to perform the duties in a way to be accepted or paid as a fully qualified worker, in contrast to a trainee. Consult the range in which the SVP estimate would fall. Circle the selected training time numerical level under Item 6 of the Job Analysis Schedule.

Definition

For purposes of job analysis, *physical demands* are defined as the physical capacities required of workers in order for them to perform in job-worker situations. *Environmental conditions* are defined as those physical surroundings of job-worker situations which make specific demands upon a worker's physical capacities.

These concepts provide two of the important criteria for collecting and classifying information about jobs, and the resulting data play a significant role in exposing potential workers to a maximum of appropriate job opportunities.

The physical requirements of a job are defined in terms of six physical demands factors. In addition, the important environmental conditions under which the jobs are performed are expressed by seven environmental conditions factors. Illustrative job-worker situations for these factors are provided to assist the analyst in collecting these data.

Physical Demands Factors, Definitions, and Illustrative situations

1. STRENGTH

This factor is expressed in terms of sedentary, light, medium, heavy, and very heavy, and is measured by involvement of the worker with one or more of the following activities:

a. Standing, Walking, Sitting

Standing — Remaining on one's feet in an upright position at a work station without moving about.

Walking — Moving about on foot.

Sitting — Remaining in the normal seated position.

b. Lifting, Carrying, Pushing, Pulling

Lifting — Raising or lowering an object from one level to another (includes upward pulling).

Carrying — Transporting an object, usually holding it in the hands or arms, or on the shoulder.

Pushing — Exerting force upon an object so that the object moves away from the force (includes slapping, striking, kicking, and treadle actions).

Pulling — Exerting force upon an object so that the object moves toward the force (includes jerking).

Lifting, pushing, and *pulling* are expressed in terms of both intensity and duration. Judgments regarding intensity involve consideration of the weight handled, position of the worker's body or part of the worker's body used in handling weights, and aid given by helpers or by mechanical equipment.

Duration is the total time spent by the worker in carrying out these activities. *Carrying* most often is expressed in terms of duration, weight carried, and distance carried.

Care must be exercised in evaluating jobs in the strength categories, particularly in interpreting the force and the physical effort a person must exert. For instance, if the worker is in an awkward position while crouching, he may experience as much difficulty pushing a 5-pound force as he would exerting six times that force pushing at waist height.

Also, if he is required continuously to lift, push, and pull objects weighing 15 pounds or to carry these objects long distances, the worker may exert as much physical effort as he would in occasionally or even frequently lifting, pushing, and pulling objects twice as heavy, or in occasionally carrying these objects over short distances.

The five degrees of Strength are defined and illustrated below.

Sedentary Work

Lifting 10 pounds maximum and occasionally lifting and/or carrying such articles as dockers, ledgers, and small tools. Although a sedentary job is defined as one which involves sitting, a certain amount of walking and standing is often necessary in carrying out job duties. Jobs are sedentary if walking and standing are required only occasionally and all other sedentary criteria are met.

Situations Illustrating Sedentary Work

Sits at bench and inspects findings and finished pieces of jewelry for size, flaws, and defects in plating, using scales and tweezers. Items to be inspected are brought on a tray to the worker and weights lifted are negligible.

Repairs defects in hosiery by hand, using needle, thread, scissors, and mending cup, all of which weigh only a few ounces. Sewing is generally carried on while sitting.

Sits at desk most of day, takes dictation and transcribes it on typewriter. Occasionally walks to various parts of department, when called upon to take dictation, and carries papers and materials of negligible weight.

Sits at drawing board and walks occasionally. Carries negligible weights such as papers, instruments, and books.

Light Work

Lifting 20 pounds maximum with frequent lifting and/or carrying objects weighing up to 10 pounds. Even though the weight lifted may be only a negligible amount, a job will be in this category (1) when it requires walking or standing to a significant degree; or (2) when it requires sitting most of the time but entails pushing and pulling of arm and/or leg controls.

Situations Illustrating Light Work

Lifts cans, jars, or bottles from cardboard carton and places them on conveyor. Removes filled or capped containers which weigh approximately 2 or 3 pounds maximum from one conveyor belt and places them on another. Maintains a rapid constant pace to keep up with speed of filling or capping machine.

Constantly stands to set up and operate machine that cuts grooves in wooden parts. Continuously lifts, pulls, pushes, and carries lumber, frequently weighing 1 to 5 pounds and occasionally as much as 15 to 20 pounds to feed it into the machine.

Walks and stands constantly while arranging records in file cabinets, drawers, boxes, etc. Sits occasionally to sort papers. Weight lifted does not have to meet certain criterion because greater part of day is spent walking and standing, and pushing and pulling file drawers.

Stands and walks behind counter of variety store all of working day wrapping and bagging articles for customers.

Medium Work

Lifting 50 pounds maximum with frequent lifting and/or carrying of objects weighing up to 25 lbs.

Situations Illustrating Medium Work

Fabricates articles and equipment out of sheet metal, occasionally carries tools and sheet metal, weighing 50 lbs. maximum, to workbench. Lifts sheet metal to workbench and machine, and pushes and pulls it into proper position.

Carries lumber, weighing up to 50 pounds, from supply room to workbench, a distance of approximately 20 feet. Stands greater part of day, bending, and lifting lumber. Pushes and pulls lumber on workbench or machine.

Lifts, pushes, and pulls to jack up automobile, to remove tire from wheel, and to remount tire on wheel. Most tires weigh approximately 25 pounds, but seldom weigh more than 50 pounds, and wheels are rolled instead of carried to repair work area.

Assists in lifting patients, pushing litters, and pulling sheets in making beds. Walks and stands constantly.

Walks and stands continuously when dismantling, testing, adjusting, repairing, and installing engine parts of an aircraft. Lifts and carries parts of engines weighing from 25 to 50 pounds for inspection and repair. Pushes and pulls components into position.

Heavy Work

Lifting 100 pounds maximum with frequent lifting and/or carrying of objects weighing up to 50 pounds.

Situations Illustrating Heavy Work

Digs trench to specified depth and width which involves a constant cycle of pushing shovel into earth and lifting, carrying, and throwing shovelsful of earth onto a pile. Shovel often is raised to shoulder height and weight lifted is concentrated at its end. Shovel and earth weigh approximately 20 pounds, but the continuous effort involved requires strength comparable to that required by frequent lifting up to 50 lbs., and occasional lifting up to 100 lbs.

Lifts and carries metal weighing 35 to 50 pounds to charge furnace. Frequently pushes and pulls from awkward crouching position to turn metal in furnace with tongs. Periodically withdraws metal from furnace and carries it with assistance to forge.

Frequently lifts and carries pipe and pipe connections weighing 50 lbs. and occasionally up to 100 lbs. and with aid of helpers, fits heavy pipe assemblies into place. Stands, stoops, and crouches while reaching above and below shoulder height to pull pipes into position and grasp pipes and tools. Pushing and pulling heavy objects from awkward positions requires more strength than performing these activities from a normal position. Pushing weights to above shoulder height involves greater force than lifting weights to waist level.

Stands all day to mix pastry. Lifts and carries 100 lbs. bags of flour about 20 feet from stack to mixing bowl. Turns and stoops to lift sugar and shortening each weighing 50 lbs. from lower tier and drums.

Pushes handtruck up and down warehouse aisles, to fill orders, stooping and lifting cartons or items with average weight of 65 lbs. and placing them on truck: Pushes items to wrapping area. Lifts cartons from truck in order to complete packing, wrapping, sealing, and labeling for shipping. Lifts cartons to skids for shipping.

Very Heavy Work:

Lifting objects in excess of 100 pounds with frequent lifting and/or carrying of objects weighing 50 pounds or more.

Situations Illustrating Very Heavy Work

Usually Loads and unloads truck when transporting or delivering articles, such as furniture, refrigerators, and machinery, many of which weigh in excess of 100 lbs.

Loads and unloads trailers and semi-trailers with produce, such as crates of oranges, celery, tomatoes, and lettuce, weighing from 80 to 110 pounds.

Performs any or all machine and hand operations necessary to fabricate and assemble boilers, tanks, vats, and other vessels made of heavy steel plates weighing up to 120 pounds.

Installs ship's steam, diesel, or electric propelling and auxiliary machinery and equipment, such as pumps, cargo-handling machinery, anchor-handling gear, ventilating and firefighting equipment, steering gear, and armament.

2. CLIMBING AND/OR BALANCING

Climbing — Ascending or descending ladders, stairs, scaffolding, ramps, poles, and the like, using feet and legs and/or hands and arms.

Balancing — Maintaining body equilibrium to prevent falling when walking, standing, crouching, or running on narrow, slippery, or erratically moving surfaces; or maintaining body equilibrium when performing gymnastic feats.

For climbing, the emphasis is placed upon body agility; for balancing, it is placed upon body equilibrium.

Situations in Which Climbing and/or Balancing are Important

Continuously steadies self and maintains equilibrium on erratically moving railroad dining car when serving meals to passengers.

Balances constantly on a slippery, erratically moving, floating barrier (boom) of logs to call out different owners' marks as the logs float past.

Climbs poles to install, maintain, and repair telephone, telegraph, and electrical power lines. Must maintain equilibrium while at top of pole.

Constantly maintains equilibrium while dancing and performing difficult gymnastic feats.

Situations in Which Climbing and/or Balancing are Present but not Important

Performs variety of household duties including scrubbing walls and washing windows, which involve only occasional climbing of ladders.

Occasionally climbs a few feet to inspect and repair interior and exterior of motor coach body. These activities do not require more than a minimum amount of balancing.

Serves food to patrons of restaurant. No unusual equilibrium required. Differs from maintaining balance while serving persons in dining car.

3. STOOPING, KNEELING, CROUCHING, AND/OR CRAWLING

Stooping — Bending body downward and forward by bending spine at waist.

Kneeling — Bending legs at knees to come to rest on knee or knees.

Crouching — Bending body downward and forward by bending legs and spine.

Crawling — Moving about on hands and knees or hands and feet.

The activities in this factor involve full use of lower extremities as well as back muscles.

Situations in Which Stooping, Kneeling, Crouching, and/or Crawling are Important

Stoops, kneels, crouches, and crawls to sweep and scrub floors. Involving continuous use of back and leg muscles. Frequently stoops to dispose of waste and litter and to polish fixtures and fittings.

Continuously stoops and crouches to remove weeds from flowers or crops by hand or with hoe.

Frequently stoops and crouches to load and unload boxes, bales, and hogsheads onto and from vehicles, making full use of back and leg muscles.

Operates concrete wall grinder to remove bumps and rough spots from exposed concrete surfaces in kneeling position for sustained periods when working on surfaces of structure which are below waist level.

Situations in Which Stooping, Kneeling, Crouching, and/or Crawling are Present but not Important

Intermittently stoops during working day to sort inner tubes according to color. Stoops slightly from either standing or sitting position when reaching for inner tubes in order to cut valve pads from them. This activity does not involve any unusual demand upon back and leg muscles.

Occasionally stoops to handle food, utensils, and cutlery when inspecting food preparation. Stooping activities are incidental to primary job duties of planning meals and supervising cooks.

4. REACHING, HANDLING, FINGERING, AND/OR FEELING

Reaching — Extending the hand(s) and arm(s) in any direction.

Handling — Seizing, holding, grasping, turning, or otherwise working with hand or hands (fingering not involved).

Fingering — Picking, pinching, or otherwise working with fingers primarily (rather than with whole hand or arm as in handling).

Feeling — Perceiving attributes of objects such as size, shape, temperature, or texture by means of receptors in skin, particularly those of finger tips.

Situations in Which Reaching, Handling, Fingering, and/or Feeling are Important

Turns and regulates valves, pumps, and flowmeters in production of chemical solutions of specified strength requiring full use of arms and hands in rapid and frequent movement.

Writes or uses typewriter to address envelopes, cards, packages, and similar items.

Reaches in various directions to grasp materials. Holds and moves pen so that handwriting will be clear, concise, and in proper space for each reading by post office employees. When typing, uses fingers constantly and skillfully. Intermittently reaches and handles to place envelope or paper in typewriter and to remove it when typing has been completed.

Carries guests' heavy baggage to and from hotel rooms, unpacks sample cases, and arranges contents on racks or shelves in sample rooms using full and frequent reaching and handling arm-hand functions.

In making tailored garment constantly reaches, handles, fingers, and feels to measure customer, and to cut individual patterns with scissors to measurement, mark outlines on materials with chalk, cut material according to lines with scissors or electric cutter, assemble garment parts by handsewing, fit basted garment on customer, and perform machine sewing to finish it.

Pulls out weeds by hand, or cuts out weeds with hoe making full use of upper extremities in reaching, handling, and fingering movements.

Sets up, operates, and adjusts machine tools to make and repair metal working dies, molds, fixtures, etc. Uses fingers to feel parts for smoothness. Reaches for, handles, and fingers tools, micrometers, and calipers.

Situations in Which Reaching, Fingering, and/or Feeling are Present but not Important

Supervises and coordinates the work of kitchen employees, occasionally handling written materials in preparing requisitions for supplies and in planning meals.

Records footage and grade of lumber called out by another worker by noting figures while holding clip board and pencil. Small precise writing is not demanded.

Delivers and collects departmental mail which requires narrowly restricted range of arm, hand, or finger motions. Duties may be performed with wrist or stump on one arm.

Receives callers and refers them to proper persons by recording names of callers, time of call, nature of business, and future appointments. Activities can be performed with a limited range of hand, arm, or finger motion. Writing is only at short intervals and consists of entering names, dates, etc., in spaces on appointment book or pad. Speed is not required.

Controls valves, at directed intervals, at river pumping station using narrowly restricted range of arm or hand reaching and handling movements.

5. TALKING AND/OR HEARING

Talking — Expressing or exchanging ideas by means of spoken word.

Hearing — Perceiving nature of sounds by ear.

Talking is important for those activities in which the workers must impart oral information to clients or to the public, and in those activities in which they must convey detailed or important spoken instructions to other employees accurately, loudly, or quickly.

Hearing is important for those activities which require ability to receive detailed information through oral communication, and to make fine discriminations in sounds, such as when making fine adjustments on running engines.

This factor is not important in activities in which the worker may receive oral instructions only for a few times daily and does not give any instructions or engage in other than very short conversations.

Situations in Which Talking and/or Hearing are Important

Gives information over telephone in answer to questions: Talking and hearing are, therefore, essential requirements.

Talks continuously, exhorting passing public, describing attractions, and emphasizing features of show.

Talks with patients concerning food, diets, and menus; and with employees to train them in food planning, preparation, and serving in accordance with dietary standards and hospital procedures.

Situations in Which Talking and/or Hearing are Present but not Important

Scours and cleans marble fixtures and trim in a hotel or office building receiving only short oral instructions.

Makes statistical calculations in regard to pension and insurance plans. Ability to speak and hear is not required to carry out this activity.

Operates drycleaning machine to clean garments, draperies, and other articles, utilizing knowledge of cleaning processes, fabrics, and colors to determine proper procedure. Any exchange or oral instructions are incidental to primary duties in operating drycleaning machine.

Carries test loads of grain samples from cars being unloaded, and from mills during milling process to laboratory for chemical analysis bringing back analysis report to supervisor. Amount of talking involved in worker's contact with chemists and supervisor is no more than for average production worker who receives oral instructions only a few times daily and engages in only short conversations.

6. SEEING

Seeing is the ability to perceive the nature of objects by the eye. The Important aspects of vision are:

Acuity, far — Clarity of vision at 20 feet or more.

Acuity, near — Clarity of vision at 20 inches or less.

Depth Perception — Three-dimensional vision. Ability to judge distance and space relationships so as to see objects where and as they actually are.

Field of Vision — Area that can be seen up and down or to right or left while eyes are fixed on a given point.

Accommodation — Adjustment of lens of eye to bring an object into sharp focus. This item is especially important when doing near-point work at varying distances from eye.

Color Vision — Ability to identify and distinguish colors.

Seeing is important for those activities in which good eyesight is required for production and/or safety of self and others. There are two kinds of activities in which seeing is important: (1) hazardous jobs in which defective seeing would result in injury to self and others; and (2) jobs in which special and minute accuracy, inspecting, and sorting is demanded.

Seeing is not significant in all situations where vision is required. However, when a high degree of visual efficiency is required, this factor is important. The effects of intense and continuous seeing demands on visual efficiency (accommodation primarily), and visual demands made by moving machinery and other objects (field of vision and depth perception primarily) also should be considered.

Situations in Which Seeing is Important

Pilots airplane to transport passengers, mail, or freight, or for other commercial purposes: Normalcy in all visual aspects is required. Near acuity and accommodation are required for close inspection of instruments and to read charts. Far acuity, depth perception, and field of vision are required for take-off, watching for landmarks, and landing. Color vision is required to recognize red and green lights on instrument panel and colored landing signals.

Tends machine that shapes and dries hose: Accurate alinement of stockings with marks on forms demands normal, near visual acuity, and accommodation. Continuous close inspection requires ability to bring stockings into sharp focus without blurring.

Drives bus to transport passengers over specified routes: Normalcy in all visual aspects is required to drive bus carefully and in compliance with traffic regulations. Depth perception, far visual acuity, and field of vision are required to judge distance and avoid accidents with vehicles, pedestrians, and other obstacles. Near-point visual acuity and accommodation are required to read instruments on dashboard and to shift vision suddenly from dashboard to distant objects. Efficient color vision is required to react quickly to traffic lights.

Cuts multiple layers of fabric into parts: Normalcy in sustained near acuity and accommodation are required to guide electrically powered cutting machine through layers of fabric along chalk lines or around pattern pieces. Worker must continuously keep chalk lines or pattern in sharp focus without blurring.

Repairs and services office machines: Near acuity and accommodation are required in inspection and adjustment of very minute parts. In addition, sustained vision is required in alignment of parts.

Designs, lays out, and prints letters and designs to make signs: Good color vision is needed to mix paint and pigments to get desired colors. Good accommodation and near acuity are required to lay out letters and transfer designs. Must exercise care in alining letters evenly, making them same size and filling in marked letters with specified color.

Reads typescript or proof of type setup to detect and mark errors: Near acuity and good accommodation are required for continuous reading of typescript or proof of type setup to detect and mark for correction, typographical, grammatical, or compositional errors.

Situations in Which Seeing is Present but Not Important

Drives and controls farm tractor to till soil and to plant, cultivate, and harvest crops: Uses some depth perception, far visual acuity, and field of vision. Minor defects in these visual aspects are allowable because the tractor is driven slowly in an open field and driver does not have to pass other cars, observe traffic lights, or drive within specified traffic lanes. In cultivating and harvesting processes may veer from course without mishap other than damage to small part of crop.

Inserts printed matter into folders or envelopes: Brief intermittent reading of printed or typed material is needed in order to insert material in envelopes for mailing or sorting. Only gross near-point vision is required for this activity.

Measures curtains, draperies, and bedspreads to determine if lengths meet specifications and pins hems in them, using layout table: Gross acuity and accommodation are required to adjust layout machine, to clamp bottom of curtains or draperies to straight-edge, varying length of material against scale, and to fold and pin edge of material to make hem. Demarcations and figures on scale are of easily readable size and color, and measurements do not have to be made to close tolerances.

Applies paint, varnish, or enamel to exteriors and interiors of industrial plants or other structures: Worker does rough painting on such structures as barns, sheds, fences, and highway guard rails. Uses large brushes and usually works with only one or two colors. Precision, such as is involved in tracing, lettering, shading, or working on very small surfaces, is not required in this situation.

Tunes pianos in private and public establishments: Vision is not required in testing and adjusting strings of piano to produce proper sound. Tuning is carried out by use of tuning fork and adjustment of tuning hammer. Both of these activities involve feeling and listening rather than seeing.

Operates and maintains stationary engines and mechanical equipment: Makes use primarily of moderate degrees of near acuity and accommodation to observe large dials, meters, and gages located at varying distances from eyes and to make minor repairs and adjustments to equipment. Imperfections in all of these visual aspects are allowable because dials are large, adjustments do not require close sustained inspection, and reading of instruments is intermittent and not sustained.

Environmental Conditions Factors and Illustrative Situations

1. INSIDE, OUTSIDE, OR BOTH

Inside — Protection from weather conditions but not necessarily from temperature changes.

Outside — No effective protection from weather.

Both — Activities occur inside and outside in approximately equal amounts.

Situations Illustrating Inside Work

Assembles electric motors in enclosed assembly area of industrial plant: Plant area may be drafty or stuffy depending on season and outside temperature. Worker may leave building to visit cafeteria or other facility but remains inside at his work station virtually 100 percent of time.

Crates eggs in open-sided shed on poultry farm: Roof protects worker from incliment weather and affords some degree of protection against temperature changes, although not from wind or dampness.

Drives truck between distant cities or shipping points from enclosed cab: Windows may be opened or closed depending on driver preferences. Driver may alight from cab occasionally, but remains inside nearly 100 percent of time.

Situations Illustrating Outside Work

Erects and repairs electric-power lines, often in inclement weather and at any time of night or day, although canvas tent may be used during rain or snowstorms.

Delivers mail to residential areas, often in inclement weather, spending only 25 percent of time sorting mail in post office and riding bus to and from beginning of mail route.

Picks field crops, frequently in heat of sun, continuing during light rainstorms. Usually works during growing season, coincident with mild weather.

Situations Illustrating Both

Drives delivery truck over established route, alighting at each stop to unload deliveries: Loads truck at start of route. Spends about half of time in enclosed cab of truck, remainder of time out of doors.

Paints interiors and exteriors of residential and commercial structures, usually working indoors during inclement weather.

Patrols premises of industrial plant to detect prowlers, fires, or hazards: Climbs exterior catwalks to inspect roof areas and such exterior appurtenances as air-conditioning cooling towers. Patrols parking lot, interior corridors, and working areas on regular schedule. Spends approximately half of time indoors.

2. EXTREME COLD WITH OR WITHOUT TEMPERATURE CHANGES

Extreme Cold — Temperature sufficiently low to cause marked bodily discomfort.

Temperature Changes — Variations in temperature which accompany extreme cold and are sufficiently marked and abrupt to cause marked bodily reactions.

Situations in Which Extreme Cold With or Without Temperature Changes is Important

Stores ice in cold-storage room.

Works in cooler room, usually kept at approximately 10°, while cutting up beef carcasses into standard cuts.

Stores ice cream in hardening room to solidify and keep it in good condition, and removes it for delivery and shipment: Worker goes in and out of room constantly.

Situations in Which Cold With or Without Temperature Changes is Present but not Important

Assists persons between curb and door of an establishment.

Handles cold items during preparation and serving of soft drinks and ice-cream dishes, but works at normal room temperature while handling such items.

Works at normal room temperature, occasionally handling cold items while displaying and selling meat.

3. EXTREME HEAT WITH OR WITHOUT TEMPERATURE CHANGES

Extreme Heat — Temperature sufficiently high to cause marked bodily discomfort.

Temperature Changes — Variations in temperature which accompany extreme heat and are sufficiently marked and abrupt to cause marked bodily reactions.

Situations in Which Extreme Heat With or Without Temperature Changes Is Important

Works close to hot stove during cooking operations while carrying on various activities such as agitating, testing, and draining cooking mixture.

Charges furnace, turns billets in furnace, and withdraws heated billets.

Works constantly around hot tumblers in laundry room reaching in and removing articles when partially cooled.

Controls movement of machine that spreads hot asphalt on streets and roads and is subjected to intense heat produced by heating mechanism of machine.

Situations in Which Heat With or Without Temperature Changes Is Present but not Important

Patrols outside swimming pools and beaches during hot summer months.

Makes short trips into kitchen carrying dishes from dining room working primarily in dining room, clearing and setting tables, rather than near stoves in kitchen.

Performs a wide variety of duties on a general farm on which livestock and field crops are raised.

4. WET AND/OR HUMID

Wet — Contact with water or other liquids.

Humid — Atmospheric conditions with moisture content sufficiently high to cause marked bodily discomfort.

Included in this factor are conditions in which the worker has contact with water or other liquids and/or works in an oppressively humid atmosphere, such as the slashing department of a cotton-textile mill or the wet-cleaning room of a drycleaning plant.

Situations in Which Wetness and/or Humidity are Important

Presses garment using pressing machine and is constantly exposed to oppressive humidity resulting from steam emitted by pressing machine and by damp garments which are being ironed.

Loads damp articles into tumblers: Removes hot, dried articles from tumblers. Atmosphere is wet and humid.

Situations in Which Wetness and/or Humidity are Present but not Important

Shaves, shampoos, gives facial massage and applies tonic to hair of patron in a barber shop: Hands come in contact with water for only short periods of time.

Computes cost of customer's laundry: Surroundings may be somewhat humid but not uncomfortably so, because worker is not usually in close proximity to water and steam-producing laundry machines.

Sprays paint or glaze on finished pottery or porcelain ware or unburned terra cotta blocks: While this job requires the individual to work constantly with liquids, it is not necessary for him to have his hands in the liquids, nor would the working area be considered significantly humid.

5. NOISE AND/OR VIBRATION

For this factor to be primary there must be sufficient noise, either constant or intermittent, to cause marked distraction or possible hearing loss and/or sufficient vibration (which is the production of an oscillating movement or strain on the body or its extremities from repeated motion or shock) to cause bodily harm if endured day after day.

Do not consider this factor important unless the noise reaches 80 or more decibels. See tables on page

Situations Illustrating Noise and/or Vibration

Operates compressed-air, rock-drilling machine to drill holes through hard materials: Exposed to continuous vibration plus noise of approximately 130 decibels.

Operates frame-spinning machine for spinning thread out of roving: Noise levels in large spinning rooms with many frames in operation at once reach approximately 105 decibels making conversation impossible, except by shouting.

Operates a tractor to scoop up earth: Is subject to intense vibration while scraper is forced into ground and while tractor is driven forward to fill scraper with dirt. In excavating and transporting earth, tractors are frequently driven over bumpy ground, resulting in jolting sufficient to cause possible bodily harm if endured day after day.

Rivets structural-steel members by spreading rivet shank and shaping the head with pneumatic hammer; reams misalined rivet holes with electrically driven or hand-reaming tool. Riveting and construction operations reach approximately 130 decibels intensity.

Situations in Which Noise and/or Vibration are Present but not Important

Drills holes in picture frames: Operating a small electric drill subjects worker to noise of approximately 65 decibels.

Solders parts into circuits of radios and other electronic devices, working in large room with other solderers: Sound in room is approximately 60 decibels intensity.

Types on manual typewriter: Is subject to moderate sound of approximately 70 decibels intensity, an amount not considered to be fatiguing, while performing duties or directing group of typists.

6. HAZARDS

Conditions or situations in which there is danger to life, health, or bodily injury. This category includes a variety of physical hazards, such as proximity to moving mechanical parts, electrical shock, working on scaffolding and high places, exposure to burns and radiant energy, exposure to all types of explosives, and exposure to toxic chemical and biological agents.

Situations in Which Hazards are Important

Demolishes parts of buildings to reach and combat fires and rescue persons endangered by fire and smoke and is exposed to burns, fumes, smoke, and falling objects.

Repairs energized electric lines and is subject to falls when climbing poles and to serve burns or electrocution.

Blasts rock in quarry and is exposed to danger from explosives and flying fragments of rock. Worker must retreat to place of safety after lighting fuses with match or squib.

Situations in Which Hazards are Present but not Important

Cooks in hotel kitchen subject to possible slight burns from stove and hot grease when cooking foodstuffs, and to minor knife cuts in preparing food for cooking or immediate table use.

Delivers telegrams, usually by bicycle and is subject to ordinary hazards of traffic.

Performs domestic duties in home and is subject to ordinary household hazards.

7. ATMOSPHERIC CONDITIONS

These following conditions affect the respiratory system or the skin.

Fumes — Solid particles generated by condensation from the gaseous state, generally after volatilization from molten metals, and often accompanied by a chemical reaction such as oxidation. For example, cadmium, lead, magnesium, manganese, and zinc fumes are toxic and may cause metal fume fever.

Odors — Noxious nontoxic smells.

Typical Overall Sound Levels[1]

Given Distance from Noise Source		Decibels	Environmental
		-140-	
50-Hp. Siren	(100′)		
F-84 At Take-Off (80′ from Tail)			
Hydraulic Press	(3′)	-130-	
Large Pneumatic Riveter	(4′)		Boiler Shop (Maximum Level)
Pneumatic Chipper	(5′)		
		-120-	
Multiple Sand Blast Unit	(4′)		
Trumpet Auto Horn	(3′)		Jet Engine Test Control Room
Automatic Punch Press	(3′)	110-	
Chipping Hammer	(3′)		Woodworking Shop
Cut-Off Saw	(2′)		Inside DC-6 Airliner
Annealing Furnace	(4′)	-100-	
Automatic Lathe	(3′)		Can Manufacturing Plant
			Inside Subway Car
Subway Train	(20′)		
Heavy Trucks	(20′)		
Train Whistles	(500′)	- 90-	Inside Motor Bus
10-Hp. Outboard	(50′)		Inside Sedan in City Traffic
Small Trucks Accelerating	(30′)		
		- 80-	
Light Trucks in City	(20′)		Office with Tabulating Machines
Autos	(20′)		Heavy Traffic (25′ to 50′)
		- 70-	
			Average Traffic (100′)
			Accounting Office
Conversational Speech	(3′)		Large City Industrial Areas
		- 60-	
15,000 Kv.-a, 115 Kv. Transformer	(200′)		
		- 50-	Private Business Office
			Light Traffic (100′)
			Average Residence
		- 40-	
			Minimum Levels for Residential Areas in Large City at Night
		- 30-	Broadcasting Studio (Speech)
			Broadcasting Studio (Music)
		- 20-	Studio for Sound Pictures
		- 10-	
Threshold of Hearing		- 0-	

---

[1] This table adapted from chart on page 2, *Handbook of Noise Measurement* by Arnold P. G. Peterson, and Lee L. Beranek (Cambridge, Mass.: General Radio Co., 1956).

Dusts — Solid particles generated by handling, crushing, grinding, rapid impact, detonation, and decrepitation of organic and inorganic materials such as rock, ore, metal, coal, wood, and grain. Toxic dusts include those which may produce pneumoconiosis, systemic poisoning, dermatoses of primary irritant or allergic nature, and cancer. For example, some ore bodies containing various forms of quartz can be causes of silicosis.

Mists — Suspended liquid droplets generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersed state, such as splashing, foaming, and atomizing. Includes chromic acid mists from electroplating, acid and alkali mists from pickling or electro-plating cleaning operations, and oil mists generated from machine tool lubricants and coolants.

Gases — Normally formless fluids which occupy the space of enclosure and which can be changed to the liquid or solid state only by the combined effect of increased pressure and decreased temperature. Carbon monoxide, hydrogen cyanide, oxides of nitrogen, and ozone are among the gases of significance as industrial hazards.

Poor Ventilation — Insufficient or excessive movement of air causing a feeling of suffocation or exposure to drafts.

This factor is importfant only if these conditions are present to a degree or a length of time sufficient to cause marked discomfort or possible bodily injury to the worker. When atmospheric conditions involve possible bodily injury, they should also be rated under hazards. If the worker is subject to such conditions for short periods of time at infrequent intervals and to a very moderate degree, the factor is not considered important.

Situations in Which Atmospheric Conditions are Important

Stacks grain by hand or with pitchfork during harvesting and threshing and is exposed to heavy concentrations of dust from movement of grain.

Controls kettle to melt lead: Is constantly exposed to toxic fumes from melting lead sufficient to cause bodily harm.

Operates a battery of stills to distill crude oil and is exposed to toxic gases and obnoxious odors when working around hot furnace.

Cleans scrap tobacco: Shovels tobacco on screens, and tobacco dust from receptacle under fine screen into containers: This worker must constantly breathe air which is filled with tobacco dust. While there are probably ventilation systems present which alleviate this condition to a certain extent, the worker is constantly stirring up dust by shoveling and keeping it in motion. Nearness to dust by shoveling process is unavoidable and even ventilating systems cannot completely eliminate this condition.

Situations in Which Atmospheric Conditions Are Present but not Important

Drives a delivery truck and is exposed to fumes from vehicles as encountered in ordinary traffic in amounts unlikely to cause discomfort or to result in injury to the respiratory system.

Mixes paint in retail store and is exposed to fumes only when mixing small amounts to customer's order.

Carries dishes into kitchen from dining room and is exposed to kitchen odors, generally of insufficient strength to cause discomfort.

Procedures For Completing the Physical Demands and Environmental Conditions Form

(*Refer to sample form in back of this section.*)

ESTAB. JOB TITLE

Enter the most frequently used title by which the job is known in the establishment.

ESTAB. & SCHED. NO.

Enter the same number that appears on the job analysis schedule which this form accompanies.

PHYSICAL DEMANDS

Enter the appropriate information for each activity, irrespective of whether it will be reflected later in the ratings.

Factor 1. Strength

a. Standing, Walking, and Sitting

Enter beside each of these activities, the percentage of time the worker is required to spend in them. These percentages should add up to 100%.

b. Lifting, Carrying, Pushing, and Pulling

Record, by symbol, the appropriate information for each activity — also under "Weight", indicate the number or range of pounds the worker must lift, carry, push, or pull.

Explanation of Symbols:

NP	Not Present	— Activity or condition does not exist.
O	Occasionally	— Activity or condition exists up to ⅓ of the time.
F	Frequently	— Activity or condition exists from ⅓ to ⅔ of the time.
C	Constantly	— Activity or condition exist ⅔ or more of the time.

Factors 2–6 All Other Physical Demands

Record the appropriate symbol in the space provided opposite each activity.

Record in the comments section any supplemental or clarifying information pertinent to each activity, such as apparatus used, dimensions of work space, tools and materials used, speed and frequency of actions, sensory requirements, and complexity of communications. In each instance the comments should be identified with the numbered factor and the activity to which it pertains.

RATINGS

Select and encircle those factors which meet the criteria of importance. The criteria are implicit in the physical demands definitions and illustrations.

ENVIRONMENTAL CONDITIONS

Enter the appropriate information for each condition irrespective of whether it will be reflected in the ratings.

Factor 1. Work Location

Enter the percentage of time that the worker spends inside and/or outside. The total should add up to 100%.

Factors 2–7 All Other Environmental Conditions

Record by symbol, opposite each condition, the appropriate information, except for Factor 5. In Factor 5, record the estimated maximum number of decibles of sound and vibrations as adapted from "Typical Overall Sound Levels" table, page . Record in the comments section supplemental or clarifying information, such as temperature, time, source, and frequency of sounds, and explanations of hazardous, dusty, or toxic conditions.

RATINGS

Select and encircle those factors which meet the criteria of importance. These criteria are implicit in the Environmental Conditions definitions and illustrations. For Factor 1, Environment, "I" should be encircled if the worker spends more than 50% of his time inside, "O" if he spends more than 50% of his time outside, and "B" if he spends approximately equal time both inside and outside.

PROTECTIVE CLOTHING OR PERSONAL DEVICES

Describe in this section any special clothing or protective devices which the worker is required to wear or use while performing his job duties.

Procedures for Recording Physical Demands and Environmental Conditions Ratings on the Job Analysis Schedule (Item 6)

In Item 6 of the job analysis schedule, encircle the Physical Demands and Environmental Conditions ratings which have been previously encircled in the Ratings sections of the Physical Demands and Environmental Conditions Form.

Definition

Within the U. S. Training and Employment Service, aptitudes are defined as the specific capacities or abilities required of an individual in order to facilitate the learning of some task or job duty.

Estimating Aptitude Requirements of Jobs

The aptitudes component is one of the basic criteria used in evaluating an individual's potential for a kind of work or for a specific job.

The kinds and amounts of aptitudes possessed by a person can be measured by administering and interpreting tests. The aptitude requirements of jobs, for nine aptitudes found to be important in job success, can be determined from research on the General Aptitude Test Battery (GATB).[1] For the purpose of determining the requirements for all jobs, two additional aptitudes were added to the nine which comprise the General Aptitude Test Battery.

To date GATB norms have been established for approximately 500 jobs and it has been necessary to develop a procedure for determining the aptitude requirements for the occupations for which no test norms are available.

Such a method has been developed. It utilizes comparison of duties in the job analyzed to the duties involved in occupations for which there are test development data. Essentially it is a system of comparing job analysis data to illustrative situations which have been evaluated quantitatively and qualitatively in standardizations of the General Aptitude Test Battery.

These illustrative situations are representative of the various categories of jobs in the economy. They include situations in which a particular aptitude is significant and also those in which it is not significant, as determined in the qualitative analysis made during the GATB test development research.

Each illustration is introduced with a lead statement which reflects the overall activity. Where necessary to reflect the importance of the aptitude, descriptive data supplement this statement. This was given special emphasis for the cognitive aptitudes (intelligence, verbal, numerical, spatial, form perception, clerical perception, and color discrimination) which are often harder to rate because we cannot "see" the worker utilizing these capacities on the job. However, in instances where the application of the aptitude to the job is explicit in the job-worker situation, no attempt was made at further explanation.

The sources of data for the illustrations were the technical reports on standardization of the General Aptitude Test Battery and analysts' estimates. When the technical reports provided the data, the mean score for the sample was used as a method of arriving at the amount of the aptitude required for average, satisfactory performance on the job.

These amounts are expressed in terms of levels, which in turn reflect equivalent amounts of the aptitudes possessed by segments of the working population, as follows:

1. *The top 10 percent of the population.* This segment of the population possesses an extremely high degree of the aptitude.
2. *The highest third exclusive of the top 10 percent of the population.* This segment of the population possesses an above average of high degree of the aptitude.
3. *The middle third of the population.* This segment of the population possesses a medium degree of the aptitude, ranging from slightly below to slightly above average.
4. *The lowest third exclusive of the bottom 10 percent of the population.* This segment of the population possesses a below average or low degree of the aptitude.
5. *The lowest 10 percent of the population.* This segment of the population possesses a negligible degree of the aptitude.

Aptitudes, Definitions and Illustrative Situations

G — INTELLIGENCE

General learning ability. The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. Closely related to doing well in school.

---

[1] "Manual for the Aptitude Test Battery", Sec. III: "Development" (Washington: U.S. Department of Labor, Manpower Administration, U.S. Training and Employment Service, 19 .)

Level 1

G-1:1 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields by mathematical methods:

Intelligence is required to understand meanings and relationships of mathematical symbols, formulas, and concepts; to assimilate background information required to understand problems from various fields; to develop or apply appropriate methods and procedures for solving problems; and to present solutions or methodologies for solution in logical and systematic forms and sequences.

G-1:2 Conducts experiments on substances, of which an essential element is carbon, to develop and improve materials and products and to discover scientific facts:

Comprehends the principles underlying chemical properties and chemical changes of elements and compounds. Must work with theoretical concepts and see new relationships or applications of them.

G-1:3 Performs a variety of engineering work in designing, planning, and overseeing the manufacture, installation, operation, or maintenance of electric or electronic components, equipment, systems, facilities, and machinery used in the generation, transmission, distribution, and utilization of electrical energy for domestic, commercial, and industrial consumption:

Intelligence is required to understand principles of engineering; to apply engineering principles to the design, operation, or repair of electrical equipment or systems; and to conduct research on new applications or uses.

G-1:4 Diagnoses mental and emotional disorders of individuals and administers programs of treatment:

Required to learn, understand, and apply the basic theories, principles, and techniques used in the field of psychology.

G-1:5 Converts scientific, engineering, and other technical problem formulations to format processable by computer:

Intelligence is required to learn, understand, and apply programming principles and techniques; to learn functions and applications of data-processing equipment; to work with mathematical principles and methodology to solve scientific and engineering problems; to reason and make decisions based on analysis of data; to identify, analyze, and organize the elements of a problem into a logical sequence for computer processing; to translate elements or terms of a problem into synthetic machine language for computer direction; and to prepare instructions for console operator.

G-1:6 Diagnoses and treats diseases, injuries, and malformations of teeth and gums, and related oral structures:

Intelligence is required to understand and apply principles of dental anatomy, bacteriology, and physiology for diagnosis and treatment, and to use techniques of dental restoration, and prosthetics. Must understand the operation and function of dental tools and equipment; and the uses of dental metals, alloys, and amalgams.

G-1:7 Writes original plays such as tragedies, comedies, or dramas, or adapts themes from fictional, historical, or narrative sources, for dramatic presentation:

Intelligence is required to utilize basic principles of playwriting, including basic research on characters, dress, and furnishings of the time-setting of the play, and to show depth of understanding in the development of situations and roles.

G-1:8 Receives individual applications for insurance to evaluate degree of risk involved and accepts applications, following company's underwriting policies:

Utilizes a knowledge of insurance, finance, and economics. Must be able to understand application of information such as medical reports and occupational hazards, financial reports, fire inspection reports, and insurance maps. Must work with actuarial formulas, study and relate all phases of an insurance risk problem, and come to a decision beneficial to the needs of the applicant and to the interests of the company.

G–1:9 Studies origin, relationship, development, anatomy, functions, and other basic principles of plant and animal life:

Intelligence is required to study scientific facts and concepts which are needed for an understanding of the structure, function, development, and relationship of living organisms, and to draw conclusions or generalizations from accumulated facts.

G–1:10 Coordinates activities of radio and television studio and control-room personnel to insure technical quality of pictures and sound for programs originating in studio or from remote pickup points:

Intelligence is required to plan and arrange for all audio, visual, and special effects equipment and technical personnel needed for programs; use judgment to determine number of cameras, etc. necessary to achieve specified effects; and give work assignments to technicians who control and maintain lights, audio and visual controlling equipment, microphones, and cameras. Must understand functions and capabilities of equipment to give directions.

Level 2

G–2:1 Collects, analyzes, and develops occupational data concerning jobs, job qualifications, and worker characteristics to facilitate personnel, administrative, or information functions in private, public, or governmental organizations:

Intelligence is required to plan work and develop research procedures; to evaluate information in order to make judgments and decisions; to organize material, determine worker functions, and estimate worker requirements. Must be able to understand the essential elements in a variety of jobs in different industries, and know enough about the technology involved and knowledge required of the workers to explain, describe, and classify the occupations.

G–2:2 Manages an industrial organization, determining and executing administrative policies through subordinate managers and coordinating the activities of various departments:

Intelligence is required to learn and understand the overall techniques and problems in the field of management including some knowledge of the various specializations such as production, marketing, personnel, and finance, and their application to the specific industry and firm involved; and to analyze management problems and make judgments.

G–2:3 Applies principles of accounting to install and maintain operation of general accounting system:

Intelligence is required to learn and apply principles and procedures of accounting; to evaluate accounting and record keeping system; to analyze problems and develop system which provides needed records for internal operation and to meet requirements of regulatory and other government agencies; and to prepare analyses and interpretations of records for company officials.

G–2:4 Compounds and dispenses medications, following prescriptions:

Understands the composition and effects of drugs and is able to test them for strength and purity. Checks prescriptions to determine whether dosages are reasonable and the drugs chemically and physiologically compatible. Must be able to compound ingredients to form powders, pills, ointments, and solutions. Must make sterile solutions, buy medical supplies, and advise the medical staff on the selection and effects of drugs.

G–2:5 Perform chemical, microscopic, and bacteriologic tests to provide data for use in treatment and diagnosis of disease:

Intelligence is required to learn the basic principles relating to biochemistry, microbiology, parasitology, blood cells, body cells, viruses, serums, and vaccines, and the preparation and examination of tissue. Must determine type of test(s) to make from laboratory request and apply knowledge of laboratory techniques and principles of appropriate sciences to the preparation, analysis, and classification of specimens.

G-2:6 Draws and corrects topographical maps from source data, such as surveying notes, aerial photographs, or other maps:

Learns and applies drafting principles, procedures, and symbols and the geometry and mathematics peculiar to topography, and is able to translate aerial photographs and other data into accurate maps.

G-2:7 Schedules and assigns motor vehicles and drivers (according to availability, length of trip, freight requirements, vehicle capacities and licenses, and user preferences) for conveyance of freight:

Intelligence is required to learn company and governmental regulations, equipment, routes, and the characteristics of a variety of products which affect their shipment. Must analyze data for reports on operations and personnel, and plan the organization of reports, daily work, and the assignment of vehicles and drivers.

G-2:8 Repairs electronic equipment such as computers, industrial controls, radar systems, telemetering and missile control systems, transmitters, antennas, and servomechanisms, following blueprints and manufacturers' specifications, and using handtools and test instruments:

Intelligence is required to learn and apply electronic theory; to understand the functions and operation of equipment worked on, and of test equipment used; and to reason and make judgments when determining trouble shooting sequence, making diagnosis, and determining corrective procedures.

G-2:9 Instructs students in one or more subjects such as English, mathematics, or social studies, in private, religious, or public secondary school (high school):

Intelligence is required to learn teaching methods and the subject matter for the curriculum taught; to determine the difficulty level of subject matter relative to the students; to plan presentations of subject matter and prepare tests; to assist pupils through various teaching methods; and to evaluate their progress.

G-2:10 Prepares bodies for interment in conformity with legal requirements:

Intelligence is required to learn and apply basic principles and techniques related to mortuary science including chemistry, anatomy, physiology, principles of preservation, disinfection, circulatory embalming, cavity treatment, hygiene, microbiology, restoration, and cosmetics; and to learn the laws and regulations relating to embalming.

G-2:11 Plans and designs artistic interiors for homes, hotels, ships, commercial and institutional structures, and other establishments:

Requires the ability to learn principles of design from textbooks and practical experience and apply them in developing plans for customer within specified cost range. Must accurately estimate cost of furnishings and decorating work. Must be able to direct workers engaged in decorating and installing furnishings and fixtures.

G-2:12 Reads typescript or proof or type setup to detect and mark for correction any grammatical, typographical, or compositional errors:

Intelligence is required to learn rules of grammar and punctuation, and standard proofreaders' marks and codes. Learns the terminologies and word usages associated with various subject areas to proof a variety of material.

G-2:13 Creates designs and prepares patterns for new types and styles of men's, women's, and children's wearing apparel or knitted garments:

Intelligence is required to understand and apply the principles of garment construction; to acquire essential knowledge of fabrics, design, and color; and to gather ideas for new models by reading fashion magazines and trade journals.

G–2:14 Operates boilers, turbines, generators, and auxiliary equipment at generating plant to produce electricity:

Learns and understands the operation and control of mechanical and electrical equipment such as boilers, water and vacuum pumps, coal driers and pulverizers, steam condensers, turbines, generators, switch gears, and electrical circuits. Is able to interpret readings of meters and gages and other monitoring devices to determine when some portion of the system is not functioning properly. Must determine sequence to close down or isolate parts of system, to by-pass malfunctioning units or for maintenance, without interfering with other equipment or the power supply.

G–2:15 Plans, lays out, and constructs wooden unit- or sectional-patterns used in forming sand molds for castings, analyzing blueprints, and using handtools:

Intelligence is required to learn and apply a knowledge of woodworking techniques and casting processes; to interpret blueprints and plan sequence of operations; to lay out workpiece and make judgments with respect to numerous calculations and measurements required; and to determine how to divide sectional patterns to facilitate their removal from sand molds.

G–2:16 Analyzes a variety of specifications, lays out metal stock, sets up and operates machine tools, and fits and assembles parts to make and repair metalworking dies, cutting tools, jigs, fixtures, gages, and machinists' handtools, applying knowledge of tool and die design and construction, shop mathematics, metal properties, and layout, machining, and assembly procedures:

Intelligence is required to understand blueprints and other specifications; to plan sequence of operations and lay out and set up procedures; to determine type of machine and tools to use and machine settings based on type of operations to be performed, type of material being processed, and dimensions and other specifications to be achieved.

G–2:17 Directs operation of a retail, self-service food store according to the overall organization policies:

Intelligence is required to direct the operation of self-service food market profitably and in accordance with overall organization policies; to requisition or purchase store merchandise; to interview and hire new employees and train them in company policies and procedures; to plan and direct work assignments; to maintain good employee and customer relations; and to prepare required reports.

G–2:18 Repairs and adjusts radios and television receivers, using handtools and electronic testing instruments:

Intelligence is required to learn basic radio and TV theory, circuitry, and use of test instruments; to analyze operational symptoms in determining nature of faults in radio and television sets; and to make necessary repairs.

G–2:19 Keeps records of financial transactions of establishment:

Intelligence is required to learn and apply the principles and practices of accounting and the types and uses of various forms, journals, and reports, to apply knowledge and judgment when making entries according to system used to provide records; and to figure out probable sources of errors when records do not balance.

G–2:20 Receives and pays out money, and keeps records of money and negotiable instruments involved in various bank transactions:

Learns the rules and procedures involved in a variety of banking transactions.

G–2:21 Verifies accuracy of figures, calculations, and postings pertaining to business transactions recorded by other workers:

Intelligence is required to learn procedures for verifying figures, computations, and postings on a variety of forms; to learn and apply coding and compilation of data; to determine when an entry indicates a transaction in conflict with some other event such as double payments or overpayments; and to understand the relationship between the various forms used so errors can be located, and traced from one record to another.

G–2:22 Blows and shapes glass laboratory apparatus, such as test tubes, retorts, and flasks, and glass components for such apparatus as condensers, vacuum pumps, barometers, and thermometers, according to blueprint specifications:

Intelligence is required to learn principles and techniques of glass blowing; to read and interpret blueprints; to plan sequence of operations; determine methods to use; and solve problems encountered.

Level 3

G–3:1 Renders general nursing care to patients in hospital, infirmary, sanitarium, or similar institution:

Intelligence is required to learn and apply principles of anatomy, physiology, microbiology, nutrition, psychology, and patient care used in nursing; to make independent judgments in absence of doctor; and to determine methods and treatments to use when caring for patients with varying illnesses or injuries.

G–3:2 Sets up and operates camera to photograph illustrations and printed material, to produce film or glass negatives used in the preparation of lithographic printing plates:

Intelligence is required to learn the principles and techniques of photographing, developing, and printing, including the use of various equipment such as cameras, lenses, filters, and contact printers, to make color or black and white negatives. Understands effects of variables such as light, exposure time, and film or paper sensitivity on photograph or print. Is able to compute reduction and enlargement ratios and be able to make line and half tone negatives and color separations. Uses judgment to determine equipment and procedures to use for each job.

G–3:3 Registers and assigns rooms to guests, sorts mail, transmits and receives messages using telephone, teletype, and switchboard, answers questions pertaining to hotel services and accommodations and makes reservations, keeps record of rooms occupied and guests' accounts and collects payments:

Intelligence is required to learn the procedures of checking guests in and out of inn or motel; to learn record-keeping procedures; operation of cash register, switchboard, and teletype; and to acquire pertinent information about accommodations and services and the surrounding area.

G–3:4 Repairs, maintains, and installs electrical systems and equipment such as motors, transformers, wiring, switches, and alarm systems:

Learns basic electrical theory and circuitry, blueprint reading, local building codes, and safety practices. Reasoning and judgment are involved in diagnosing faults and choosing most feasible method of repair.

G–3:5 Sells tickets for transportation agencies such as airlines, bus companies, railroads, and steamship lines:

Intelligence is required to have a working knowledge of time schedules, rates, routes, and accommodations available. Must learn reservation procedure and use judgment when serving customers to assist them in selecting accommodations so as to promote use of transportation services.

G–3:6 Takes dictation in shorthand of correspondence, reports, and other matters, and transcribes dictated material, using typewriter:

Intelligence is required to learn meaning and usage of shorthand symbols; to learn typewriter operation and memorize keyboard; to learn rules for format of business letters and reports and rules of spelling, punctuation, and grammar.

G-3:7 Drives truck over established route to deliver, sell, and display products or render services:

Intelligence is required to acquire and use knowledge of company products or services, unit cost, and policies; to discuss customer's needs and promote sales; to apply company policies and own judgment regarding delivery procedures, credit extension, discounts, etc., in a manner to maintain good customer relations; to maintain accounts and records; and to determine best driving routes to reach customers.

G-3:8 Cares for ill, injured, convalescent, and handicapped persons in hospitals, clinics, private homes, sanitariums, and similar institutions:

Intelligence is required to learn and apply principles and techniques of basic nursing skills, body structure and functions, personal hygiene, nutrition, and first aid; and to use judgment in patient care, moving patients, and giving prescribed medicines and injections.

G-3:9 Assembles and loads a variety of solid propellant rocket motors:

Intelligence is required to learn the various steps in preparing and loading solid propellant fuels for rockets; to understand specifications and follow them explicitly when mixing liquid and dry ingredients to form propellant; to use judgment when handling and processing propellant to avoid explosions; to determine when chemicals are properly mixed and cured from instrument readings on control panel, and using charts and direct observation via TV monitors.

G-3:10 Displays, describes, and sells, a variety of commodities in a sales establishment, using general knowledge of the characteristics, quality, and merits of items sold:

Intelligence is required to understand selling features of merchandise, make suggestions to customers, and understand and apply sales training.

G-3:11 Constructs and repairs dental appliances, according to prescription:

Intelligence is required to learn and apply basic principles of dental anatomy, casting and fabricating techniques, and properties of materials used. Must be able to understand written and oral instructions and make independent judgments regarding the design and construction of prosthetic dental appliances.

G-3:12 Operates telephone switchboard to establish or assist customers in establishing local or long distance telephone connections:

Intelligence is required to learn operation of switchboard procedures for handling various types of calls and situations when dealing with customers; and to use manuals to determine routes for calls and applicable rates.

G-3:13 Provides beauty services for customers:

Intelligence is required to learn the various phases of cosmetology including hair cutting, styling, setting, and facial treatment, and the various methods used; to use reason and judgment to suggest various treatments to customers; and assist them in deciding on hair style according to their individual features and taste.

G-3:14 Examines metal watch parts, such as pinions, wheels, and barrels using microscope to detect scratches, rust, discolorations, blemishes, and similar defects, to verify dimensions:

Intelligence is required to learn and apply inspection methods, to identify defects, and to determine allowable margins for defects and dimensional tolerances for different parts.

G-3:15 Sets up knitting machines to knit hose, garment, and cloth according to specifications, and adjusts and repairs machines, using knowledge of machine functions:

Intelligence is required to learn the principles of how a knitting machine functions and is controlled and how to

120

set up from pattern design charts. Must use judgment and apply knowledge of machine function to determine causes of malfunctions by observing machine output or operation. Must understand written and oral instructions to set up and make repairs.

G-3:16 Solders together components of metal products on production line, using hand soldering iron and soft solder:

Intelligence is required to learn soldering methods and understand the variables presented by different types of material or kinds of solder. Must be able to determine probable cause and corrective action when faults occur in soldered joints.

G-3:17 Coordinates and expedites flow of materials parts, and assemblies within or between departments in accordance with production and shipping schedules or department supervisor's priorities:

Intelligence is required to learn production sequences; to understand production schedules; to apply reasoning to locate materials or parts in process; to confer with supervisors to establish completion time; and to prepare reports of inventories or production.

G-3:18 Assembles, inspects, and tests microwave tubes, components, subassemblies, and parts according to specifications using equipment such as spot welder, sealing machine, lapping machine, handtools, frequency meter, and oscillograph:

Is able to understand verbal instructions and operation sheets and diagrams; to operate and adjust machines; and to use judgment when measuring, testing, and inspecting assembled tubes to verify conformance to specifications and assembly diagrams.

Level 4

G-4:1 Repairs and maintains physical structures of commercial and industrial establishments such as factories, office buildings, apartment houses, and logging and mining constructions; using handtools and power tools: Replaces defective electrical switches and outlets and fuses. Paints structure and repairs woodwork with carpenter's tools. Makes minor plumbing repairs such as repairing faucets, drains, and sanitary fixtures. Patches and repairs cement, brick and concrete block walls, and plaster and dry walls:

Intelligence is required to learn and apply basic principles of electrical circuitry, plumbing, and structural maintenance. Uses reasoning to determine cause of malfunctions and to plan repair and maintenance steps. Must understand instructions and work orders.

G-4:2 Tends one or more machines that knit fabrics, garment parts, or other articles from yarn:

Intelligence is required to learn operation of machine, including adjustment of guides and tension rollers to obtain length, width, and mesh specifications; how to thread yarn through guides, tension springs, etc.; and replacement of defective needles.

G-4:3 Repairs and adjusts sewing machines in homes and sewing departments of industrial establishments, using handtools:

Intelligence is required to understand the basic construction and operation of sewing machines; to understand operating manuals and diagrams pertaining to the specific construction and operation of a variety of makes and models; and to use reason in diagnosing cause of malfunctions.

G-4:4 Makes women's garments, such as dresses, coats, and suits, according to customer specifications and measurements:

Intelligence is required to understand basic principles of garment construction and pattern alteration; to understand instructions from customers and pattern instructions; and to reason when altering patterns to customers' measurements.

G-4:5 Assists in care of hospital patients, under direction of nursing and medical staff:

Intelligence is required to learn patient care and handling and hospital routine;

to understand and carry out orders correctly; to use reason and judgment in handling patients, noting patient's condition and reporting symptoms or reactions which may indicate a change in condition.

G-4:6 Positions, fits, and attaches sub-assemblies or components such as axles, wheels, springs, motor, transmission, trim, instrument cluster, or controls in the final assembly of an automobile, using mechanics' handtools and pneumatic wrenches or screw drivers:

Intelligence is required to learn how parts are positioned and attached and which parts go on specific models of cars. (Cars are mixed by body styles and other characteristics and workers frequently shift to different operations on the line.)

G-4:7 Sorts agricultural produce such as bulbs, fruits, nuts, and vegetables, according to grade, color, and size, discards cull items and foreign matter, and places produce in containers:

Recognizes indications of defects, such as spots or softness, and learns grading characteristics for a variety of produce. Uses judgment in sorting out partially defective produce.

G-4:8 Drives gasoline- or electric-powered industrial truck or tractor, equipped with forklift, elevating platform, or trailer hitch, to push, pull, lift, stack, or tier merchandise, equipment, or bulk materials in warehouses, storage yard, or factory:

Intelligence is required to understand oral instructions from foreman concerning materials to be moved, their location and destination, and how they are to be stacked or stored. Uses judgment to determine if vehicle is operating efficiently and to resolve job problems.

G-4:9 Removes stems from tobacco leaves to prepare tobacco for use as filler, binder, or wrapper for cigars, plug, or twist chewing tobacco:

Intelligence is required to learn technique of stripping leaves clean of stems without tearing the leaves.

G-4:10 Feeds or removes metal stock from automatic fabricating machines:

Learns work routine, acceptable tolerances, and difference between acceptable imperfections and those to be rejected. Uses judgment to determine from observing parts processed or machine operation when machine should be stopped because of some malfunction.

G-4:11 Assists workers engaged in preparing foods for hotels, restaurants, or institutions, by washing, peeling, cutting or grinding meats, vegetables, or fruits, preparing salads, mixing ingredients for desserts, portioning foods on plates or serving trays, loading serving trays on delivery carts, carrying pans and kettles to and from work station, and cleaning work area, equipment and utensils:

Intelligence is required to learn routine of kitchen, location of materials, equipment, and utensils, and various tasks to be performed. Must understand instructions pertaining to mixing of ingredients for salads, gelatin and pudding-mix desserts; and for portioning food.

G-4:12 Positions shirts on shirt presses, activates press to lower pressing head, removes and folds pressed shirts:

Learns uses and operation of specialized shirt presses such as body press, collar and cuff press, and sleeve press and sequence of pressing operation. Must learn how shirt parts are to be positioned on press bucks and use judgment in positioning shirt of various styles and cuts.

G-4:13 Launches and moors boats on lake or similar amusement places, and shows patrons how to guide crafts, such as rowboats and canoes:

Determines kind of demonstration to give according to previous experience of patrons.

G-4:14 Shakes, sorts, feeds into ironer, and folds linens, such as sheets, pillow cases, tablecloths, and dish towels:

Learns procedures for shaking out linens preparatory to ironing, sorting, feeding, and methods of folding various linens.

G-4:15 Holds level rod or stadia rod at designated points to assist in determining elevations and laying out construction stakes for mapmaking, construction, mining, land, and other surveys:

Learns procedures of surveying; follows verbal or hand signals from instrument man to position rod or target on rod in exact position; and notes reading when position has been established.

Level 5

No illustrations.

V — VERBAL APTITUDE

The ability to understand meaning of words and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meanings of whole sentences and paragraphs.

Level 1

V-1:1 Attends to a variety of medical cases in general practice, diagnosing, prescribing medicine for, and otherwise treating diseases and disorders of the human body, and performing surgery:

Verbal aptitude is required for reading comprehension of complex technical materials in such areas as anatomy, biochemistry, physiology, pharmacology, pathology, bacteriology, and radiology; and for facility of expression to explain illness, treatment, or preventive measures to patients, or to discuss diagnosis and symptoms with colleagues.

V-1:2 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields, and solves or directs solutions to problems in various fields by mathematical methods:

Verbal aptitude is required to understand terminology from such fields as engineering, data processing, or management in order to read materials from such disciplines, to discuss problems with others whose background is in such fields and explain to them how mathematical concepts can be adapted to the solution of their problems.

V-1:3 Designs chemical plant equipment and devises processes for manufacturing chemicals and products, such as gasoline, synthetic rubber, plastics, detergent, cement, and paper and pulp, applying principles and technology of chemistry, physics, mechanical and electrical engineering, and related areas:

Verbal aptitude is required to acquire the technical vocabulary of chemistry and engineering; in order to read and understand reference materials; and to write technical reports, and design or production specifications.

V-1:4 Diagnoses mental and emotional disorders of individuals and administers programs of treatment:

Verbal aptitude is required to comprehend the literature and lecture material necessary for acquiring knowledge in the field of psychology; to communicate well with patients in order to elicit information about and understand their background, attitudes, etc., to aid in diagnosing their problems, to write evaluations of clients, and to explain cases to other specialists when developing treatment programs in consultation.

V-1:5 Directs editorial activities of newspaper and negotiates with production, advertising, and circulation department heads as owner's representative:

Verbal aptitude is necessary to write lead or policy editorials explaining complex political, social, or other issues in language which will be understood by most readers; to interpret the editorial policy of the firm on specific issues to other editorial writers; and to speak at professional and community functions as a representative of the publisher.

V-1:6 Conducts criminal and civil lawsuits, draws up legal documents, advises clients as to legal rights, and practices other phases of law; and represents client in court, and before quasi-judicial or administrative agencies of government:

Verbal aptitude is required to comprehend and interpret legal terminology for use in preparing legal documents, and in presenting oral or written arguments.

V-1:7 Selects, catalogues, and maintains library collection of books, periodicals, documents, films, recordings, and other materials, and assists groups and individuals to locate and obtain materials:

Verbal aptitude is required to review materials preparatory to purchase to see that they do not duplicate others and are consistent with the subject matter collection policy of the library; to accurately determine subject matter of books in order to properly code them and prepare cross references; and to prepare and give talks to groups of patrons.

V-1:8 Collects, analyzes, and develops occupational data concerning jobs, job qualifications, and worker characteristics to facilitate personnel, administrative, or information functions in private or public organizations:

Verbal aptitude is required to read, understand, and interpret various kinds of technical data; to write reports, letters, and job descriptions concisely and clearly; and to conduct information gathering interviews.

V-1:9 Draws cartoons for publication to illustrate highlights of news topics in a satirical or humorous manner:

Verbal aptitude is required to read news items to obtain subject for cartoon; discuss policy and method of presentation with editor; translate ideas from verbal to pictorial form; and select most significant wording for caption to bring out meaning of cartoon.

V-1:10 Instructs and advises poultry and egg producers in developing programs for disease prevention and control, building and equipment maintenance, and improving poultry raising:

Verbal aptitude is required to read and understand technical journals on poultry husbandry; to discuss the scientific aspects of housing, sanitation, and feeding of poultry with poultrymen and explain the effects of variations in environment, feeding, or treatment on output and quality. Writes technical reports of findings and recommendations for individual producers.

Level 2

V-2:1 Converts symbolic statement of business problem to detailed logical flow charts for coding into computer language and solution by means of automatic data-processing equipment:

Verbal aptitude is required to read and understand statements of operations and procedural routines from various departments; to discuss program objectives and output requirements with supervisor and department heads; to explain programming techniques and principles while attending briefings, meetings, and interviews; and to write a documentation of each program's development.

V-2:2 Instructs students in one or more subjects such as English, mathematics, or social studies in private, religious, or public secondary school (high school):

Verbal aptitude is required to read and understand textbooks or other literature related to the subject matter taught; to lecture on, discuss, and explain subject matter to convey information to the students; to write lesson plans and outlines; and to read students' papers and write critiques.

V-2:3 Studies origin, relationship, development, anatomy, functions, and other basic principles of plant and animal life, usually specializing in research centering around a particular plant, animal, or aspect of biology:

Verbal aptitude is required to read and comprehend information concerning biological sciences and to express verbally (orally or in writing) findings from investigations in various fields such as agriculture, animal or plant life, genetics, pharmacology, and microbiology.

V–2:4 Introduces various types of radio or television programs, interviews guests, and acts as master of ceremonies:

Verbal aptitude is required to read news flashes and commercials aloud; to describe orally public events such as parades and conventions as the events occur; to interview guests; and to write scripts and news copy.

V–2:5 Performs chemical, microscopic, and bacteriologic tests to provide data for use in diagnosis and treatment of disease:

Verbal aptitude is required to comprehend technical language of pathology and microbiology in order to read and interpret work orders; prepare notes on findings for pathologist, and to record test results.

V–2:6 Edits motion picture film and sound track:

Verbal aptitude is required to listen critically to the dialogue to determine if it is understandable and maintains the story continuity.

V–2:7 Interviews job applicants in employment agency and refers them to prospective employers for consideration:

Verbal aptitude is required to speak and understand the applicants' language in order to learn their background, qualifications, and goals. Verbal aptitude is also required to explain the employment service to employers and obtain requirements data for job orders.

V–2:8 Sets up and operates small scale chemical production equipment such as reactors, stills, stripping towers, separators, and blending tanks, under laboratory conditions to test methods and chemical processes for product development, following specifications and guidance from research chemists or engineers:

Verbal aptitude is required to understand chemical terminology; to read and understand specifications for chemical processes; and to write reports of test procedures and results.

V–2:9 Reads book or script of radio and television programs to detect and recommend deletion of vulgar, immoral, libelous, or misleading statements:

Verbal aptitude is required to understand the expressed and implied meanings and possible connotations of words in script and statements in the context used.

V–2:10 Performs dental prophylactic treatments and instructs groups and individuals in care of teeth and mouth:

Verbal aptitude is required to learn dental anatomy, dental hygiene, prophylaxis, and prosthesis; and to present dental hygienics to groups and individuals of various ages and social backgrounds.

V–2:11 Schedules and assigns motor vehicles and drivers for the conveyance of freight according to company and government regulations and policies:

Verbal aptitude is required to read and understand the rules, laws, regulations, and/or policies of the company, union, and Interstate Commerce Comimssion; to effectively communicate instructions to drivers; and to write reports.

V–2:12 Inspects logging operations to insure that workers adhere to contract provisions and safety laws and to prevent loss of timber through breakage and damage to residual land:

Verbal aptitude is required to read and understand contract provisions, safety laws, and company policies as criteria used in evaluation; and to write evaluation report.

V–2:13 Conducts reception interview of applicants to route them to correct departments (units) and maintains employment office records:

Verbal aptitude is required to question applicants to determine their needs; to give explanations regarding employment office services; and to give instructions for completing forms or for other actions applicants must take.

V–2:14 Reads typescript or proof of type setup to detect and mark for correction any grammatical, typographical, or compositional errors:

Verbal aptitude is required to comprehend the terminology of a variety of subjects and know the specific meaning of words in the context of a particular subject matter and to detect variations from a specified or usual usage when proofing material from a variety of subjects.

V–2:15 Plans and designs artistic interiors for homes, hotels, ships, commercial and institutional structures, and other establishments:

Verbal aptitude is required to communicate with a variety of clients to determine their preferences and the functional requirements of the interior; to present plans to client; and to give directions to tradesmen.

V–2:16 Creates designs and prepares patterns for new types and styles of clothing:

Verbal aptitude is required to read trade journals and fashion magazines to keep abreast of trends in styling, materials, and construction; to converse with salesmen and buyers about new styles; and to write construction, color scheme, and fabric specifications for experimental models.

V–2:17 Prepares working plans and detail drawings from rough or detailed sketches or notes, for engineering or manufacturing purposes according to specified dimensions:

Verbal aptitude is required to read and understand textbooks and references used in drafting, such as those specifying material characteristics or information on manufacturing methods. Must understand oral instructions from design engineer and write technical data such as material specifications and functional requirements for drawing.

V–2:18 Sells automotive parts and equipment and advises customers on substitution or modification of parts when replacement is not available:

Verbal aptitude required to ask pertinent questions to determine merchandise desired by customer; to answer technical questions and explain use of parts; and to provide other information requested.

V–2:19 Takes dictation, in shorthand, of correspondence, reports, and other matters, and transcribes material, using typewriter:

Verbal aptitude is required to comprehend meaning of words to record and transcribe dictation accurately.

Level 3

V–3:1 Operates switchboard to provide answering service for clients:

Greets caller and announces name and phone number of client; records and delivers messages; furnishes information; accepts orders; and relays calls.

V–3:2 Operates boilers, turbines, generators, and auxiliary equipment at generating plant to produce electricity:

Confers with operator being relieved concerning operational status of boiler unit, turbo-generator unit, and related fuel, air, water, and steam systems; reads station log and notes any unusual switching operations performed, and equipment placed in or out of service; discusses planned repair, maintenance or construction with individual in charge of work to plan switching sequences required to close down or isolate specific equipment; and enters information on equipment operation and changes in station log.

V–3:3 Sets type by hand and machine, and assembles type and cuts in a galley, for printing articles, headings, and other printed matter; determining type size, style, and compositional pattern from work order:

Verbal aptitude is required to understand the meaning of words when proofreading copy and written instructions; and for knowledge of proper spelling, grammar, and punctuation.

V–3:4 Types letters, reports, stencils, forms, addresses, or other straight copy material from rough draft or corrected copy:

Verbal aptitude is required to understand the meaning of words, sentences, and whole paragraphs well enough so that in copying from a rough draft insertions which are out of context or incorrectly placed can be noted.

V–3:5 Supervises and coordinates activities of workers engaged in assembly of electronic equipment such as radar and sonar units, missile control systems, computers, cables and harnesses, and test equipment:

Explains wiring and soldering procedures to new employees. Reads test reports to determine cause of equipment failures and explains procedures to workers to correct practices that result in defects. Explains company policies and discusses grievances with workers or their representative.

V–3:6 Drives truck over established route to deliver, sell, and display products or render services: Calls on prospective customers and solicits new business; informs regular customers of new products or services; and writes delivery orders.

V–3:7 Controls equipment units or systems that process chemical substances into specified industrial or consumer products according to knowledge of operating procedures and chemical reactions, laboratory results, and correlation of process instrumentation:

Verbal aptitude is required to understand sufficient chemical terminology to read job specification pertaining to processing procedures, equipment operation, and ingredients; and to write a daily log.

V–3:8 Installs and services automatic oil burners in furnaces in homes or commercial establishments: Reads work order specifying equipment to be installed or receives oral directions from supervisor concerning installation requirements. Discusses any unusual features of installation.

V–3:9 Questions patients to obtain their medical history, personal data, and to determine if they are allergic to dental drugs or have any complicating illnesses: Converses with patient in reassuring manner; explains post operative care, oral hygiene, and importance of preventive dentistry to patients. Greets patients, answers telephone, and schedules appointments.

V–3:10 Sells variety of commodities in sales establishment: Describes salient features to customer, and advises customer in making selection by explaining use of particular article or suggesting other articles.

V–3:11 Plans layout, and installs and repairs wiring, electrical fixtures, apparatus, and control equipment:

Verbal aptitude is required to read and understand local electrical code; to discuss problems or questions with architect or general contractor; to read manufacturer's instructions when assembling and installing equipment or controls.

V–3:12 Operates machine to cast complete lines of type, from type metal, and deposits them in galley, in composed form for printing:

Verbal aptitude is required to read instructions on size and style of type, length of line, and other specifications; to read copy when setting type; and to read proofreader's marks.

V–3:13 Conducts tours for visitors of radio and television station facilities and explains duties of members of station staff, operation of equipment, and methods of broadcasting. Must have general knowledge of various phases of radio and television station operations.

V–3:14 Operates several types of power construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers, or motor graders to excavate and grade earth, erect structural and reinforcing steel, and pour concrete:

Verbal aptitude is required to understand instructions and directions given by foreman or supervisor; and to read and interpret operational procedures, safety rules, and safe operating procedures.

V–3:15 Drives electric powered streetcar to transport passengers, collects fares, and gives information to passengers:

Verbal aptitude is required to read and interpret assigned schedules and traffic and company regulations; and to answer inquiries from passengers concerning route, schedule, and fare.

V–3:16 Sets up and operates machine tools, and fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines, applying knowledge of machine, shop mathematics, metal properties, and layout machining procedures:

Verbal aptitude is required to read text materials while attending classes during training or apprenticeship. Must understand language in shop orders, specifications, and other written or oral instructions.

V–3:17 Provides beauty service for customers: Suggests coiffure according to physical features of patron and current styles, or determines coiffure from instructions of patron. Suggests cosmetics for conditions such as dry or oily skin:

Verbal aptitude is required to greet patrons, ascertain services desired, and explain beauty treatments, hair styles, and other services.

V–3:18 Serves food to patrons at counters and tables of coffee shops, lunchrooms, and other dining establishments where food service is informal:

Studies menu to learn contents and to determine specials. Greets customers, answers questions about menu, and makes suggestions regarding food and service. Writes order on check or memorizes it. Relays order to kitchen.

V–3:19 Fabricates, assembles, installs, and repairs sheet metal products and equipment such as control boxes, drainpipes, ventilators, and furnace casings according to job order or blueprints:

Verbal aptitude is required to read and understand text materials and lectures on characteristics of sheet metals, measurement and layout procedures, and metal forming techniques and applications during training; and to follow verbal and written work orders.

V–3:20 Repairs and overhauls automobiles, buses, trucks, and other automotive vehicles:

Reads and interprets technical manuals, charts, and parts manuals to plan work procedures and select replacement parts; discusses nature and extent of damage and repairs needed with customer and service manager.

V–3:21 Constructs, erects, installs, and repairs structures and fixtures of wood, plywood, and wallboard, using carpenter's handtools and power tools, and conforming to local building codes:

Reads blueprints for information pertaining to materials and dimensions. Must understand building codes and company safety practice rules.

Level 4

V–4:1 Waits on customer and receives cash payments for articles selected by customer:

Gives information about items and suggests related purchases.

V–4:2 Records brand marks used to identify cattle, produce, or other commodities to facilitate identification:

Reads applications for new brands and official brand record; records assignment or reassignment of brands; reads to file reports to field inspectors.

V–4:3 Tends one or more machines that knit fabrics, garment parts, or other articles from yarn:

Reads knitting ticket for each machine to find out amount to be knitted, style, size, part, dimensions, yarn type, color, and dye lot number; receives any instructions for adjustment of machine to obtain desired quality; records production records for day; and reports any unusual problems encountered.

V–4:4 Coordinates and expedites the flow of materials, parts, or subassemblies within or between departments in accordance with production or shipping schedules, or departmental priorities:

Reads production schedules and discusses them with department supervisors to determine overdue items; confers with supervisors to locate materials and to arrange for the processing, assembly, or repair of materials and their transportation to other departments. Confers with department supervisor to establish completion date for material; and informs production department or other unit responsible for scheduling.

V–4:5 Mixes and bakes ingredients according to recipes and production order to produce breads, pastries, and other baked goods:

Must read recipes and production orders to determine number and kind of bakery products to make, ingredients to use, and mixing and baking instructions.

V–4:6 Welds metal parts together, as specified by layout, diagram, work order, or oral instructions, using equipment which introduces a shield of inert or noncombustible gas around the electric arc to prevent oxidation:

Reads work order or receives oral instructions indicating type of material and number of units to be welded; type and size of electrode material to use; type of gas shield to use; settings for gas pressure, electric current amperage, and speed of electrode wire feed.

V–4:7 Tends any of a variety of machine tools such as lathes, drill presses, milling machines, grinders, or special purpose machines to machine metal workpieces to specifications on a production basis:

Reads written instructions or job orders to determine number and kind of parts to be machined and kind of metal stock or castings to use. Requests stock and cutting tools from stock room, specifying sizes, types, and amounts.

V–4:8 Cares for children in private home:

Must read directions for preparation of formulas, and possess sufficient vocabulary to understand instructions regarding care of children.

V–4:9 Services automobiles, buses, trucks, and other automotive vehicles with fuel, lubricants, and accessories as requested by customer:

Verbal aptitude required to understand specific instructions from station manager and to communicate with customers.

V–4:10 Reads items listed on order sheet to worker who gathers and assembles items.

V–4:11 Cuts paper or cardboard to desired size, using hand cutter:

Must read instructions on shop order giving dimension, color, and type of paper material to be cut.

V–4:12 Sorts sacks of mail or express items according to destination to facilitate loading and unloading railroad mail and express cars:

Reads tags on sacks to sort them according to destination.

V–4:13 Tends bag making machines which automatically measure, print, cut, fold, and glue or seal plain or waxed paper, polyethylene film, or cellophane to form bags:

Verbal aptitude is required to understand verbal or written instructions about number and size of bags to make and material to use when loading and adjusting machine; to request bag material from warehouse; and to discuss machine malfunctions with foreman.

V–4:14 Drives gasoline or electric-powered fork lift truck to move or stack bulk materials in warehouse or factory:

Must read assignment sheet specifying which vehicle to operate; understand oral instructions from foreman about materials to convey and their specific location and destination. Tells maintenance crew of any irregularities in tractor operation.

V–4:15 Keeps premises of commercial establishment, office building, or apartment house in clean and orderly condition:

Verbal aptitude is required to read written instructions for mixing cleaning solutions and waxes, and to prepare requisitions for supplies.

V–4:16 Operates previously set up pantograph machine to transfer designs in reduced form, from a zinc master plate to cloth printing rollers:

Reads instruction sheet which specifies starting slot for positioning of ground point on ground wheel, and number of repeats of pattern to make on roller.

V-4:17 Assembles, weighs, and measures candy ingredients, such as egg whites, butter, flavoring, condiments, and shortening according to formula:

Reads schedule, specifying products to be made to select batch card, and list of ingredients on batch card.

V-4:18 Assembles metal toys on assembly line, changing tasks as directed according to workload of department; tends drill press or punch press; fits parts together; and joins parts using resistance welder, fold-over tabs, or nuts and bolts:

Verbal aptitude required to understand oral instructions specifying parts to assemble, position of parts, sequence of assembly, and methods of fastening parts for several types and models of toys and stages of assembly.

V-4:19 Holds graduated rod at designated points to assist in determining elevations and laying out construction stakes for map-making, construction, mining, land, and other surveys:

Moves rod or target on rod following verbal signals. Calls out reading, or records reading in notebook.

Level 5

No illustrations.

N — NUMERICAL APTITUDE

The ability to perform arithmetic operations quickly and accurately.

Level 1

N-1:1 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields, and solves or directs solutions to problems in various fields by mathematical methods:

Tests hypotheses and alternate theories.

N-1:2 Analyzes business problems, such as the development of an integrated production, inventory control, and cost analysis systems, refines formulation and converts into program form for application to electronic data processing equipment:

Numerical aptitude is required to understand and use mathematical principles to compute estimated cost, time, equipment, and personnel required to solve problem.

N-1:3 Conducts research into relationship between chemical and physical properties of organic and inorganic substances and compounds:

Numerical aptitude required to derive formulas for solving unknown variables, analyzing chemical composition, and measuring reaction times and physical characteristics. Analysis and measurement require the application of mathematics through analytical geometry and calculus.

N-1:4 Performs a variety of engineering work in designing, planning, or overseeing the manufacture, construction, installation, or maintenance of electric or electronic systems, equipment, or machinery used in the generation, transmission, or utilization of electrical energy for domestic, commercial, or industrial consumption:

Numerical aptitude is required for the understanding and application of algebra, trigonometry, analytical geometry, calculus, and differential equations to engineering problems.

N-1:5 Designs industrial machinery and equipment, tools, dies, gages, jigs, fixtures, and machine attachments required for manufacturing industrial products:

Numerical aptitude is required to use analytical geometry, calculus, and differential equations to apply fundamentals of mechanical engineering to machine and tool design.

N-1:6 Converts engineering, scientific, and other technical problem formulations into format processable by computer:

Requires ability to identify mathematical formulas, equations, and assumptions presented in support of problem; to analyze problem using mathematical formulas, tables, and reference materials and make computations involving the use of linear algebra, vector analysis, differential equations, and calculus to identify each mathematical element in the solution of the problem.

N-1:7 Collects, analyzes, and interprets data on problems of public finance:

Computes or formulates problem for solution by others to determine government income and expenditures by source and function using such data as tax tables and rates, income and population projections, and proposed budget and expenditure projections. Determines impact of tax and fiscal policies on level of income and business activities. Computes initial and final distribution of tax burden and its effects from analysis of shifting and incidence patterns for various types of taxes. Computes probable revenues and effects of new taxes or tax rates. Computations and formulation of problem require the use of statistical methods, algebra, and some calculus.

N-1:8 Researches market conditions in local, regional, or national area to determine potential sales of a product or service:

Computes and analyzes statistical data on past sales of firm and general wholesale and retail sales trends to forecast future sales trends. Makes statistical projections based on population, income, sales data, and consumer surveys.

N-1:9 Reviews applications for casualty insurance to evaluate degree of risk involved following company's underwriting policies:

Determines amount of risk company will insure, based on value of property and risks involved, and the premium thereon. Determines the value of each factor affecting the degree of risk and applies the applicable premium to each using rate tables or computes the weighted value of each factor to arrive at a final composite weight used to compute the premium; computes amount of insurance in force in the particular class of risk or in the same area to assure that the company is spreading its risks sufficiently, according to probability tables.

N-1:10 Prepares cost and work completion estimates for engineering contract bids:

Computes and lists total quantity of each type of material needed from blueprints and specifications; computes quantity of standard sizes or lots needed for each segment of structure or part; estimates cost of raw materials, purchased equipment, or subcontracted work, and labor, using price lists, standard or estimated time/cost figures, and materials lists; and sets delivery of completion dates.

N-1:11 Appraises real and personal property to determine its fair value and assesses taxes in accordance with prescribed schedules:

Computes the market value of real estate by determining the individual and composite value of such factors as its location, construction, size, age, utility, and marketability at current market prices; and computes amount of tax to levy by determining the individual and total rate of taxes applicable for each taxing jurisdiction with a claim against the property, and applying these to the equalized assessed valuation of the property.

Level 2

N-2:1 Applies principle of accounting to install and maintain operation of general accounting system:

Applies numerical reasoning to design or modify systems to provide records of assets, liabilities, and financial transactions; applying arithmetic principles to prepare accounts, records, and reports based on them; auditing contracts, orders, and vouchers; and preparing tax returns and other reports to government agencies.

N-2:2 Supervises and coordinates activities of workers engaged in cruising (surveying) land for land management planning, by determining quantity and quality of logs in standing timber, or developing logging plans:

Numerical aptitude is required to determine sampling methods based on size of area and statistical sampling techniques; and to compute and summarize statistical data and prepare estimates, maps, and reports.

N-2:3 Plans and directs food service program in hospital, school, restaurant, or other public or private institution:

Numerical aptitude is required to compute size of individual portions needed to obtain required nutritional values for regular or special diets, and to calculate total quantity of foodstuffs needed for specified period based on number to be fed, menus for period, and individual quantities needed. Numerical aptitude is also required to break down total quantities into number of units by standard sizes to prepare requisitions for vendors, and to maintain and analyze food cost control records.

N-2:4 Prepares working plans and detail drawings of architectural and structural features of any class of buildings and like structure from rough or detailed sketches or notes and specified dimensions:

Calculates load and stress and strength requirements for materials; estimates size and quantities of materials needed for project; and computes costs.

N-2:5 Draws and corrects topographical maps from source data such as surveying notes, aerial photographs, or other maps:

Makes arithmetic computations to lay out scale representations of mountains, cities, and other geographic features so that correct proportions and distances are achieved.

N-2:6 Applies electronic theory, principles of electrical circuits, electrical testing procedures, mathematics, physics, and related subjects to lay out, build, test, trouble shoot, repair, and modify developmental and production electronic equipment such as computers, missile-control instrumentation, and machine tool numerical controls:

Numerical aptitude is required to calculate values and sizes of circuitry components needed, when not specified; to compute output values or potential of units; and to prepare graphs showing operating characteristics of system, using mathematical tables and formulas.

N-2:7 Designs and fabricates templates of wood, paper, sheet metal, and plastic used for laying out reference points and dimensions:

Uses trigonometric functions and tables, algebra, and arithmetic to compute angles, dimensions, and contours of template and to measure and mark layout reference points on template material.

N-2:8 Develops resistance welding and brazing machine set up data for work orders to insure that parts conform to blueprints and engineering specifications, applying knowledge of machine function, electronics, properties of metals, effects of heat, and shop mathematics:

Computes combination of pressure, current, holding time, and impact required to obtain specified weld, interpolating from tables and charts, and multiplying and dividing fractions and decimals to arrive at machine settings. Measures and makes arithmetic computations to determine dimensional set up for workpiece and electrodes and size of jigs or fixture needed.

N-2:9 Schedules and assigns motor vehicles and drivers for conveyance of freight, according to availability, length of trip, freight requirements, vehicle capacities and licenses, and user preferences:

Numerical aptitude is required to compute truck capacities for various products; estimate delivery time, compute delivery charges; and to prepare statistical reports and studies on operations, equipment, and personnel.

N-2:10 Sets up and operates small scale chemical production equipment under laboratory conditions to test methods and chemical processes for product development, following specifications and guidance from research chemists or engineers:

Numerical aptitude is required to solve standard formulas used to compute results of laboratory tests performed. Requires multiplication and division of common and decimal fractions.

N-2:11 Determines such characteristics of photographic emulsions as their speed (sensitivity), contrast, and maximum density:

Multiplies and divides decimal fractions and uses common logarithms to determine speed of emulsions which is a function of film density and exposure time.

N-2:12 Administers, scores, and interprets intelligence, aptitude, achievement, and other psychological tests:

Adds, subtracts, and uses tables to score tests; comparing test scores to standard norms and applying numerical reasoning to arrive at interpretation of test results in light of statistical statements of test's reliability and validity.

N-2:13 Monitors and controls electronic digital computer to process business, scientific, engineering, or other data according to operating instructions:

Numerical aptitude is required to prepare operating records; to time length of runs; to adhere to fixed operating schedules; and to discuss operating difficulties with programer or supervisor.

N-2:14 Repairs electronic equipment such as computers, industrial controls, radar systems, telemetering and missile control systems, following blueprints and manufacturers' specifications, and using handtools and test instruments:

Numerical aptitude is required to calculate dimension; to determine output measurements of components; to compute ratios when calibrating instruments; and to apply principles of geometry and trigonometry to compute angles and coordinates.

N-2:15 Directs operation of a retail, self-service food store according to overall organizational policies:

Numerical aptitude is necessary to determine amounts of merchandise needed based on stock and past sales and to prepare requisitions or orders; to adjust prices based on amount, condition and saleability of item; and to prepare financial reports such as sales reports, time and payroll reports, bank deposits, inventories, etc.

N-2:16 Inspects and tests completed gyroscopes for conformance with operational standards using equipment such as vibration testers, potentiometers, and other test equipment which simulate operating conditions or functions:

Numerical aptitude is required to make arithmetic calculations and compute ratios for test procedures and set up of test equipment; and to measure dimensions of gyroscope to check conformance to assembly drawings.

N-2:17 Records complete set of records of financial transactions of establishment using bookkeeping machine:

Numerical aptitude is required to record individual entries for each transaction and post totals, net amounts, and other computations, to verify entries and to summarize and balance totals insuring accuracy; and to prepare periodic trial balances and other statistical information.

N-2:18 Itemizes and totals customers' purchases in self-service grocery store, using cash register; reviewing price sheet to note price changes and price of unmarked items; recording price on cash register; collecting money from customer and making change:

Numerical aptitude is required to weigh produce and compute cost from price bar and price list; and to compute unit cost mentally when price posted is for two or more items or units and customer selects less than the number posted.

Level 3

N-3:1 Sets up and operates X-ray unit to obtain photographs of internal structure of body using standard formulas based on principles of algebra and geometry to compute amperage and voltage settings, exposure time, and distances of film from object and X-ray tube.

N-3:2 Treats patients with disabilities, disorders, and injuries to relieve pain, develop or restore function, and maintain maximum performance, using physical means such as exercise, massage, heat, water, light, and electricity as prescribed by physician:

Numerical aptitude is required to interpret clinical tests such as range of motion, muscle response, and functional tests to ascertain extent of physical loss; to determine intensity and duration of manual or mechanical therapy treatment or procedures such as weight lifting, diathermy, traction, or electro-therapy.

N-3:3 Supervises and coordinates activities of workers engaged in extracting alumina from bauxite:

Calculates feed rates of raw materials, using standard formulas and chemical analysis reports to compute rate of inputs. Studies production schedules and estimates man hour requirements for completion of job assignment; Adjusts work schedules or staffing to meet production requirements, using knowledge of capacities of machines and equipment. Maintains time and production records.

N-3:4 Sells tickets for transportation agencies such as airlines, bus companies, railroads, and steamship lines:

Computes ticket cost and taxes, using schedules and rate books; checks and weighs baggage; computes travel time and fares for different types of accommodations; prepares daily sales record showing number and class of tickets sold and amount of fare and taxes; and counts and balances cash with sales record.

N-3:5 Grows shrubs, rootstocks, cut flowers, or flowering bulbs:

Computes acreage to be planted according to estimated demand for species, availability and cost of seed, bulbs, or scion stock and space requirements for each variety. Maintains record of wages and hours of workers.

N-3:6 Sells spare and replacement parts and equipment in agency, repair shop, or parts store:

Measures parts for which no replacement is available using micrometers and gages to determine if they can be modified by machining or building up to required size; prepares sales slip or sales contract; and compute total price of sale including applicable taxes.

N-3:7 Sets up and operates machine tools and fits and assembles parts to make or repair parts, mechanisms, tools, or machines, applying knowledge of mechanics, shop mathematics, metal properties, and layout machining procedures:

Requires the application of shop mathematics, including geometry and trigonometric functions, to lay out work piece, position and set up work piece, set up machine tools, and measure work piece for conformance to standards.

N-3:8 Constructs, erects, installs, and repairs structures and fixtures of wood, plywood, and wallboard, using carpenter's hand and power tools:

Measures and computes unspecified dimensions to prepare layouts, mark cutting and assembly lines on materials, shape materials to prescribed measurements, and fit and install window and door frames, trim cabinet work, and hardware.

N-3:9 Acts as intermediary between importers, steamship companies, or airlines and Bureau of Customs by preparing and compiling documents required by Federal Government for a ship or airplane of foreign origin to discharge its cargo at a domestic port:

Computes and quotes duty rates and amounts on commodities using excise and tariff rate tables applicable to commodity.

N-3:10 Designs and prepares decorated foods and artistic food arrangements for buffets in formal restaurants:

Reviews advance menus to determine amount and type of food to be served; prepares food according to recipe; computes amount of food needed, based on number of persons to be served and standard amounts per person; and adjusts standard recipes to obtain required quantities. Measures and weighs ingredients.

N-3:11 Sells men's furnishings such as neckties, shirts, belts, hats, and accessories:

Numerical aptitude required to complete sales slips determining total amount of sale, applicable taxes, and change due customer.

N-3:12 Receives cash from customers or from other employees in payment for goods or services in retail or service establishment, and records amount received:

Computes bill, itemizes list, or ticket showing amount due using adding machine or cash register; makes change, cashes checks, and issues receipts; records amount received and prepares reports of transactions; and reads and records totals on cash register verifying against cash on hand.

N-3:13 Controls equipment units or system that process chemical substances into specified industrial or consumer products, according to knowledge of operating procedures and chemical reactions, laboratory test results, and process instrumentation:

Accurately measures units of time lapsed and temperature changes to start and stop various stages of the process in the required sequence and to prepare a log including time intervals and temperature changes at each stage of processing.

N-3:14 Strips (removes) developed photographic negative film from glass or film base and remounts it, in reverse position, on another glass plate for use in preparing photoengraving plate:

Measures with square and scale to align position of glass plate on table; measures and draws register and reference marks on glass and film as guide for positioning film; measures angle for positioning halftone contact screen on film; and measures and rules borders using ruler, dividers, and protractor.

N-3:15 Installs, maintains, and services sound and intercommunication systems, multiple antenna systems, closed circuit television systems, and associated apparatus:

Numerical aptitude is required to measure and position components of system and cable during installation; to check power and resistance of circuits to assure proper functioning of system or to locate causes of malfunction; and to compute fractions to obtain proper ratios in electrical system.

N-3:16 Sorts, records, and proves records of bank transactions, such as checks and deposit slips, using proof machine:

Adds and subtracts to locate, correct, and record errors indicated by tape totals.

N-3:17 Services automobiles, buses, and trucks, with fuel, lubricants and accessories:

Numerical aptitude is required to compute prices and total sales; and to select or advise customer on proper size, grade, or type of product following specifications for make and model of car and standard conversion tables.

N-3:18 Operates telephone switchboard to establish or assist customer in establishing local or long distance telephone connections; computes time and charges for pay telephone calls or at request of caller.

N-3:19 Constructs and repairs dental appliances such as full and partial plates, crowns, inlays, wire frames, and porcelain teeth, according to prescription:

Measures depth of undercut in teeth, from model, measures powdered porcelain and water to make porcelain teeth.

N-3:20 Tends any of a variety of machine tools such as lathes, drill presses, and milling machines to machine metal work pieces to specifications on a production basis:

Adds and subtracts to verify conformance of machined work pieces to specifications and to adjust machine controls.

N-3:21 Tends equipment that chemically cleans grease and scale from metal objects by immersion in chemical solution to prepare them for further processing:

Measures and adds specified volume of chemicals to maintain consistency of cleaning solutions.

N-3:22 Provides beauty services for customers:

Measures amounts of chemicals to mix in preparing tints, rinses, bleaches and permanent waving solutions, to maintain specified proportions. Totals cost of services rendered.

Level 4

N-4:1 Makes women's garments such as dresses, coats, and suits according to customer specifications and measurements:

Measures customer to determine dimensions of garment; and adds and subtracts to adjust pattern to customer's dimensions.

N-4:2 Inspects loaded freight cars:

Measures height and width of loads to ensure that they will pass over bridges and through tunnels on scheduled route.

N-4:3 Coordinates and expedites flow of material, parts, and assemblies within or between departments in accordance with production and shipping schedules or department supervisors' priorities:

Numerical aptitude is required to determine quantities of material, adding and subtracting to determine items of total order which are in various stages of manufacturing sequence.

N-4:4 Sets up knitting machines to knit hose, garments, and cloth according to specifications, and adjusts and repairs machines using knowledge of machine function:

Must measure, add, and subtract to determine number and size of cams and links for set up, to synchronize machine, and to make repairs.

N-4:5 Mixes and bakes ingredients according to recipes to produce bread, pastries, and other baked goods:

Numerical aptitude is required to calculate quantities and proportions of ingredients based on master recipes and for the measurement of temperatures, time, and weights.

N-4:6 Sets up and operates equipment to dust tree crops, ground crops, and livestock with liquid or powdered pesticides, fertilizers, herbicides, or hormones:

Measures and mixes specified material.

N-4:7 Records business transactions in journals, ledgers, and on special forms and transfers entries from one accounting record to another:

Adds totals of entries and original record and compares to check for posting errors.

N-4:8 Packs agricultural produce such as bulbs, fruits, nuts, eggs, or vegetables, for storage or shipment:

Numerical aptitude is required to pack prescribed number or weights of items, to follow prescribed pattern of number of items in each row, and to use specified size container for each grade or size packed.

N-4:9 Counts or weighs incoming laundry and sorts by type of article, color, fabric, or wash treatment to be given and enters count or weight on customer's laundry ticket.

N-4:10 Weighs and records weight of materials such as cotton, sugarcane, paper, cloth, plastic, and tobacco, for purpose of keeping production, receiving, shipping, or other records.

N-4:11 Tends circular knitting machines, with automatic pattern controls that knit seamless hose:

Counts bundles, and labels each grade of hose; and measures overall length of hose using scale on inspection form.

N-4:12 Serves bank officials or departments by performing messenger work:

Counts and records items delivered from one department to another and trips made in a work day.

N-4:13 Photographs patrons, using prefocused camera, to take series of miniature pictures:

Collects payment for finished photographs.

Level 5

No illustrations.

S — SPATIAL APTITUDE

Ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space.

Level 1

S-1:1 Diagnoses and treats disease, injuries, and malformations of teeth and gums, and related oral structures:

Spatial aptitude is required to read X-rays; to comprehend relation between teeth, tooth functions, tooth forms, stresses, and all phases of occlusion.

S-1:2 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields, and solves or directs solutions to problems by mathematical methods:

Spatial aptitude is required to visualize and understand the spatial relationships of objects and forces involved in a situation and their resultant effects on each other.

S-1:3 Plans and designs private residences, office buildings, theaters, public buildings, factories, and other structures; and organizes services necessary for their construction:

Plans layout of project, using visual imagination to integrate structural, mechanical, and ornamental elements into a unified design. Prepares sketches and elevation view of project for client. Prepares scale and full size drawings for use of building contractors and craftsmen.

S-1:4 Performs a variety of engineering work in designing, planning, and overseeing the manufacture, construction, installation, and operation, of electric or electronic equipment, and systems, used in the generation and utilization of electrical energy for industrial and domestic consumption:

Spatial ability is required in the design and construction of electrical systems and equipment to visualize the spatial relationships of static and dynamic components and the spatial characteristics of energy flows.

S-1:5 Draws and paints illustrations for advertisements, books, magazines, posters, billboards, and catalogs:

Renders details from memory, live models, manufactured products, or reference materials to execute design.

Level 2

S-2:1 Examines eyes to determine visual efficiency and performance by means of instrumentation and observation, and prescribes corrective procedures:

Spatial aptitude is required to visualize the anatomical structure of the eye and its optical system and functioning in order to relate the information obtained from an eye examination (using precision optometric instruments) to diagnose the problem and determine remedial treatment (lenses, exercise, etc.).

S-2:2 Prepares working plans and detail drawings from rough or detailed sketches or notes, for engineering or manufacturing purposes according to specified dimensions:

Spatial aptitude is required in interpreting blueprints, sketches, and specifications, and in preparing detailed, scale drawings of three-dimensional parts or mechanisms from sketches layout and oral instructions.

S-2:3 Performs dances alone, with partner, or in groups to entertain audience:

Spatial aptitude is required to interpret diagrams and instructions for proposed choreography; to visualize relative position of self with others; and to imagine how dance routines will appear to public.

S-2:4 Applies electronic theory, principles of electrical circuits, electrical testing procedures, engineering mathematics, physics, and related subjects to layout, build, test, trouble shoot, repair, and modify developmental and production electronic equipment, such as computers, missile-control instrumentation, and machine tool numerical controls:

Spatial aptitude is required to sketch diagrams of electronic units from specifications given by engineer; and to read electrical and electronic circuitry diagrams and blueprints to build equipment.

S–2:5 Repairs and adjusts radios and television receivers, using handtools and electronic testing instruments:

Spatial aptitude is required to read circuit diagrams in order to assemble and repair radio and television set components; to visualize power flow and spatial relationship of components and circuits as they relate to various functions, to isolate them for testing, and to test each circuit serially; and to visualize the source of trouble from observation of picture or from sound.

S–2:6 Plans, lays out, and constructs wooden unit- or sectional-patterns used in forming sand molds for castings, analyzing blueprints and using handtools:

Spatial aptitude is required to read and interpret blueprints; to visualize how to divide complex-shaped patterns into sections; to facilitate their removal from sand molds (without disturbing the sand); and to visualize the effects of metal shrinkage and adjust the pattern accordingly.

S–2:7 Analyzes a variety of specifications, lays out metal stock, sets up and operates machine tools, and fits and assembles parts to make and repair metalworking dies, cutting tools, jigs, fixtures, gages, and machinist's handtools, applying knowledge of tool and die designs, and construction, shop mathematics, metal properties, and layout, machining, and assembly procedures:

Spatial aptitude is necessary to read blueprints; to mark layout on workpiece; to set up workpiece on machine tools; and to control positioning and feed of tools to workpiece.

S–2:8 Installs, repairs, maintains, and adjusts indicating, recording, telemetering, and controlling instruments used to measure and control variables, such as pressure, flow, temperature, motion, force, and chemical composition, using handtools and precision instruments:

Spatial aptitude is required to read blueprints, schematics, and assembly diagrams; to visualize actual assemblies from such material; and to recognize spatial relationships of parts during disassembly of instruments in laboratory.

S–2:9 Creates designs and prepares patterns for new types and styles of men's, women's, and children's wearing apparel or knitted garments:

Spatial aptitude is required to visualize the garment to be created and to sketch designs of it; to construct original patterns; and to use patterns to make garments.

S–2:10 Manages industrial organization:

Spatial aptitude is required to analyze problems of plant layout and installation of production equipment.

S–2:11 Controls air traffic on and within vicinity of airport, according to established procedures and policies, to prevent collisions, and to minimize delays arising from traffic congestion:

Spatial aptitude is required to observe the spatial relationships of aircraft within the immediate vicinity of the airports; and to visualize the relative positions of other aircraft from radar and time, distance, speed, and altitude information.

S–2:12 Sets up and operates small scale chemical production equipment under laboratory conditions to test methods and chemical processes for product development, following specifications and guidance from research chemists or engineers:

Spatial aptitude is required to assemble components of the processing equipment during set up; to recognize from instrument readings the structure and composition of materials, as they move through the system; and the effect of any adjustments on those materials.

S–2:13 Inspects and tests completed gyroscopes for conformance with operational standards, using equipment, such as vibration testers, potentiometers, and other test equipment which simulates operating conditions or functions:

Spatial aptitude is required to read blueprints and wiring diagrams in order to determine that gyroscopes are assembled properly; to visualize operation to be simulated or tested by each piece of test equipment or instrument; to set up gyroscope properly and attach test equipment to appropriate leads.

S–2:14 Operates and maintains boilers, turbines, generators, and auxiliary equipment at generating plant to produce electricity:

Spatial aptitude is required in performing such duties as assembling and disassembling engines for repair, in installing new parts, and in installing, connecting, and wiring electrical generators and meters to switchboards, panels, and electrical circuits.

S–2:15 Sets up and operates machine tools, and fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines, applying knowledge of mechanics, shop mathematics, metal properties, and layout machining procedures:

Spatial aptitude is required to interpret blueprints and sketches, make layouts, set up workpiece in chuck or on face plate, and to inspect completed work for compliance with shop orders and drawings.

S–2:16 Controls and extinguishes fires, protects life and property, and maintains equipment as volunteer or employee of city, township, or industrial plant:

Spatial aptitude is required to visualize spatial relationships when positioning equipment; to avoid overhead wires and other object when raising aerial ladders to desired heights; and to drive or move apparatus in congested areas.

S–2:17 Installs rolls, passes, and guides on stands of rolling mill, according to job specifications, using handtools:

Spatial aptitude is required to visualize effect of rolls on bar when adjusting rolls; to set guides to eliminate surface defects in bar; to deliver bars in proper alignment to rolls, and to observe rolling and make adjustments as material progresses.

S–2:18 Constructs, erects, installs, and repairs structures and fixtures of wood, plywood, and wallboard, using carpenter's handtools and power tools, and conforming to local building codes:

Spatial aptitude is required to interpret blueprints and visualize the three dimensional form of the structure from prints; to lay out workpieces from blueprints; to shape and fit parts; and to construct forms for pouring concrete.

S–2:19 Assists driller in operating machinery to drill oil or gas wells using handtools or power tongs and wrenches:

Spatial aptitude is required to visualize spatial relationships rapidly while placing tools and guiding lower end of drill-pipe sections to rack and unrack them; and to be aware constantly of the location of other workers, tools, and materials as they move about work area in order to prevent accidents.

Level 3

S–3:1 Treats patients with disabilities, disorders, and injuries to relieve pain, develop or restore function, and maintain maximum performance, using physical means such as exercise, massage, heat, water, light, and electricity, as prescribed by doctor:

Spatial aptitude is required to visualize anatomic positions and the relationship between the point of application of forces and the area affected (as in traction); and to place treatment devices or administer manual treatment in relationship to the affected body part.

S–3:2 Operates bridge or gantry crane, consisting of hoist and operator's cab mounted on bridge which runs along track to lift, move, and load machinery, equipment, and variety of loose materials:

Spatial aptitude is required to observe the relationship between the moving load and fixed items, such as machines, trucks, posts, etc., in order to avoid bumping load, and to position load in trucks or on stacks, or dump it into machines or equipment.

S–3:3 Lays out reference points and dimensions on structural shapes and plates for fabricating, welding, and assembling into framework for such structures as conveyors, cranes, buildings, and bridges:

Spatial aptitude is required to read and interpret blueprints; to interpret, analyze,

139

solve, and make free sketches and instrument technical drawings; to be able to think in terms of geometric forms.

S–3:4 Sets up and operates machines that process data from tabulating cards into printed records:

Spatial aptitude is required to visualize and set up wiring pattern for plug boards from work orders specifying organization and information desired in print-out, from cards containing input, and from operating manuals; to read manuals and wiring diagrams and/or visualize section of board controlling each operation and exact circuits to plug in so machine will locate information on card, perform operation desired, and print information on form in specified location.

S–3:5 Operates offset-duplicating machine to reproduce single or multicolor copies of charts, schedules, bulletins, and related matter, according to oral instructions or layout and stock specifications on job order:

Spatial aptitude is required to observe printed copy and determine from it adjustments to make in various machine components to obtain legible copy.

S–3:6 Sets type by hand and machine and assembles type and cuts in a galley, for printing articles, headings, and other printed matter, determining type size, style, and compositional pattern from work order or general instructions:

Spatial aptitude is required to visualize final copy; select spacers for insertion between words or units to balance and justify lines; and when working from general instructions, to visualize final copy and select type faces and styles; and to use spacers which will produce a good balance, fit, and spacing.

S–3:7 Operates several types of power construction equipment, such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers, or motor graders, to excavate and grade earth, erect structural and reinforcing steel, and pour concrete:

Spatial aptitude is required to swing crane or shovel booms to desired position; to visualize and observe target point and move crane bucket or load to that point; and to position and drive machines accurately when moving earth or picking up and delivering loads.

S–3:8 Installs, adjusts, and maintains electrical wiring, switches, and fixtures in airplanes according to blueprints and wiring diagrams:

Spatial aptitude is required to determine sizes and types of control boxes, relays, instruments, and accessories to install, and their location from blueprints and wiring diagrams.

S–3:9 Forms sand molds for the production of metal castings, using handtools, power tools, patterns, and flasks, and applying knowledge of variables, such as metal characteristics, molding sand, contours of patterns, and pouring procedures:

Spatial aptitude is required to visualize mold shape from part print or pattern; to visualize flow of metal during pouring process and gas formation to determine location and size of runner and sprue holes; to visualize points of stress on mold during pouring; and to determine location for reinforcing material.

S–3:10 Constructs and repairs dental appliances, according to prescription:

Spatial aptitude is required to visualize and sketch outline of prosthetic dental appliance on stone model of upper and lower jaws, using impressions as guides; and to check movement and fit of upper and lower jaw models to determine proper alignment, and to approximate position and function of appliance being made.

S–3:11 Sets up and operates X-ray unit to obtain photographs of internal structure of body; assists in fluoroscopic examinations and X-ray therapy; and processes exposed film:

Spatial aptitude is required to visualize inner structure of human body and path of X-rays to position patient, X-ray tube, and film in proper relationship in order to obtain roentgenographs of diagnostic value; to position patient and support him so internal organs are moved into desired position; to visualize direction and spread of X-rays and select cones and diaphragms to direct rays to desired area and limit secondary radiation.

S–3:12 Supervises and coordinates activities of workers engaged in loading and unloading of ships' cargoes:

Visualizes available cargo space, spatial dimensions of individual shipments and how they can be rearranged, and order of removal at various ports to determine the sequence of load and the arrangement of the load.

S–3:13 Operates machine to cut out parts of specified size and shape from materials, such as cardboard, cloth, leather, mica, paper, plastic, or rubber:

Spatial aptitude is required to determine the best placement of the dies in relationship to the given piece of material to obtain the maximum number of cuts with a minimum of waste.

S–3:14 Makes women's garments, such as dresses, coats, and suits, according to customer's specifications and measurements:

Spatial aptitude is required to use patterns visualizing the relationship between pattern pieces and finished garment and following pattern instructions; and to alter basic patterns proportionally to adapt them to customer's measurements.

S–3:15 Repairs and rebuilds upholstered furniture, using handtools and knowledge of fabrics and upholstery methods:

Spatial aptitude is required to visualize a completed furniture piece when positioning and fitting spring assembly units and padding.

S–3:16 Sets up and operates machines that measure, print, cut, fold, glue or seal plain or waxed papers, polyethylene film, or cellophane to form bags:

Spatial aptitude is required to adjust cutters, feeders, printing roller, and other mechanisms, according to specifications for type and size of bag being produced.

S–3:17 Drives dinkey engine, to haul loaded coal cars from work sites to collecting point along underground haulageways of coal mines:

Spatial aptitude is required to determine relative position of other moving or stationary objects along narrow-gage railway to avoid collisions.

Level 4

S–4:1 Butchers and processes poultry and small animals:

Spatial aptitude is required to visualize location of joints in order to cut off wings and legs at joints and separate leg and thigh.

S–4:2 Sets up, adjusts, and repairs looms to weave cloth of specified quality and design, using knowledge of loom function and weaving diagrams and manuals:

Spatial aptitude is required to set up loom, positioning warp beam, harness, drop wire, and reed to weave specified pattern; and to check loom in operation to see that operating parts are synchronized.

S–4:3 Inspects electronic units and subassemblies, such as radio transmitters, computer circuits, and cables, for conformance to specifications:

Spatial aptitude is required to examine completed assemblies relating them to configuration sheet to determine that components are in specified positions.

S–4:4 Directs and coordinates activities of workers engaged in furnishing cafeteria services, to insure an efficient and profitable enterprise:

Spatial aptitude is required to prepare diagrams which show layout of different food items, for use of employees who place food on steamtable.

S–4:5 Presses drycleaned and wetcleaned silk and synthetic fiber garments, using hothead press or steamtable, puff irons, and hand iron:

Spatial aptitude is required to determine which size and shape of puff iron and which end of press buck to use according to shape and dimensions of garment part being pressed.

S-4:6 Tends film cutter and mounting press to mount color-film transparencies:

Aligns cutting blade of film-cutting machine with frame separating line between transparencies on film strips.

S-4:7 Smooths and finishes surfaces of poured concrete floors, walls, sidewalks, or curbs to specified textures, using handtools, including floats, trowels, and screeds:

Determines grade and contours from construction drawings and selects screeds needed to form or guide forming of work to specified shape.

S-4:8 Drives gasoline- or electric-powered industrial truck or tractor, equipped with forklift, elevating platform, or trailer hitch, to push, pull, lift, stack, or tier merchandise, equipment, or bulk materials in warehouse, storage yard, or factory:

Observes changing position of fork in relation to objects or materials to maneuver fork under load; observes position of load relative to other object to move load about and to position or stack load.

S-4:9 Receives payment for merchandise, such as bakery goods, magazines, groceries, books, and tobacco selected by customer:

Stores stock of merchandise in storage space under counters and in display racks or counters; and selects proper size wrapper or bag for merchandise.

S-4:10 Performs one or more repetitive operations on assembly line to mass produce small products, such as ball bearings, automobile door-locking units, speedometers, or carburetors:

Positions parts in specified relation to each other.

S-4:11 Tends circular knitting machines with automatic pattern controls that knit seamless hose:

Observes machine operation to be sure tension take-up rod is in right position and cycle is at proper stage before reaching into can to remove hose without injury to hand.

S-4:12 Tends units of fresh-work cigar machine that cuts wrapper leaf and wraps leaf around bunch:

Spreads wrapper leaf over die of machine in such a manner as to obtain maximum cuts per leaf.

S-4:13 Joins and reinforces parts of articles, such as garments, curtains, parachutes, stuffed toys, hats, and caps; sews buttonholes and attaches fasteners, such as buttons, snaps, and hooks, to articles; or sews decorative trimmings to articles using needle and thread:

Aligns parts, fasteners or trimming, working with two dimensions in a single plane, to obtain desired appearance when item is in use.

S-4:14 Demonstrates and sells cosmetics in a retail establishment:

Visualizes how customer's features could be improved by proper selection and application of cosmetics.

Level 5

No illustrations.

P — FORM PERCEPTION

Ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and lengths of lines.

Level 1

P-1:1 Conducts studies of all nonmetallic minerals used in horological industry:

Is able to perceive detail of grain size, pattern, and crystalline orientation in diamonds and abrasives and see differences in the features and size of grain angles using optical, X-ray, and other precision instruments.

P–1:2 Performs chemical, microscopic, and bacteriologic tests to provide data for use in treatment and diagnosis of disease:

Form perception is required to perceive pertinent details of shape, shade, and other characteristics when examining or comparing specimens or cultures under microscope.

Level 2

P–2:1 Diagnoses and treats diseases, injuries, and malformations of teeth and gums, and related oral structures:

Is able to perceive details of tooth and tissue structure and condition, tooth form, shadings of teeth (when preparing dentures), shape and shadings of teeth when examining X-rays, and parallelism and fit of dentures and inlays.

P–2:2 Performs a variety of engineering work in designing, planning, and overseeing the manufacture, installation, operation, and maintenance of electric or electronic equipment and systems used in the generation and utilization of electrical energy for industrial and domestic consumption:

Form perception is required to check blueprint details for conformance to design concept; to observe equipment and components being manufactured or in operation, noting details, such as the way components fit together and whether mechanisms function as designed or according to specifications.

P–2:3 Designs furniture lines or individual pieces for manufacture according to knowledge of design trends, competition, production costs, and characteristics of company's traditional market:

Form perception is required to check blueprints prepared from freehand sketches and scale drawings to assure that details conform to design concept of shape and proportion; to determine texture and pattern of fabric to use on upholstered furniture to enhance or accent design; and to specify details of graining and shades of finish to obtain desired effects in natural finish pieces.

P–2:4 Compares fingerprints of unknown persons or suspects with fingerprint record to solve crimes:

Visually examines pattern made by ridges to classify print according to group, and to compare details of print to other prints in same group to determine if they are identical.

P–2:5 Photographs persons, motion picture sets, merchandise, exteriors and interiors, machinery, and fashions to be used in advertising and selling:

Form perception is required to observe effect of light and shading on subject directly and in camera viewfinder or ground glass to see that desired highlights and shadow are obtained; to check image against reference lines in viewfinder or ground glass to be sure vertical lines of subject are parallel and that subject is not foreshortened due to camera angle. When developing, printing, and enlarging photographs form perception is required to see details such as shading, graining, and distortions in picture.

P–2:6 Diagnoses and treats diseases and disorders of animals:

Form perception is required to perceive pertinent details of size, shape, and form in skeletal structure, organs, tissue, and specimens of various animals.

P–2:7 Diagnoses and treats diseases of the human body, using X-rays and radioactive substances:

Is able to make visual examinations of all types of radiographs of human internal structures and note pertinent details and variations from normal structure, location, or condition to make accurate diagnoses.

P–2:8 Takes dictation in shorthand of correspondence, reports, and other matters, and transcribes dictated material, using typewriter:

Recognizes shorthand symbols.

P–2:9 Reads typescript or galley proof to detect and mark for correction any grammatical, typographical, or compositional errors:

Is able to perceive pertinent detail in proof, such as blurs, misshapen letters, margin alignment, and spacing.

P-2:10 Lays building materials, such as brick, structural tile, and concrete, cinder, glass, gypsum, and terra cotta block to construct or repair walls, partitions, arches, sewers, and other structures:

Form perception is required to cut bricks to required shape; to lay window sill bricks at proper angle; to align bricks on level plane and with uniform thickness of mortar between each joint; and to shape mortar after bricks are in place to achieve specified joint shape such as flat, concave, convex, or v-shaped.

P-2:11 Plans and draws working plans and drawings of buildings and like structures from work description sheets, design layout, and proposals; computing and entering weight and stress factors and tolerances and material specifications:

Form perception is required to draw different widths and types of lines, each with a specific meaning in architectural drawing; to indicate dimensions in appropriate places on drawing; to perceive details in general drawings and assure that they are included in detail drawings of structure sub-parts; to assure that scale is maintained throughout drawing; and to examine details of completed drawing to list all parts, and sizes and shapes of materials needed to fabricate each sub-part.

P-2:12 Draws and corrects topographical maps from source data, such as surveying notes, aerial photographs, or other maps:

Is able to perceive details of land contours or other physical features in stereoscopic aerial photographs and other topographical maps; draw different widths and types of lines, each with specific meanings in topography; and assure that scale is maintained throughout drawing.

P-2:13 Performs dental prophylactic treatments and instructs groups and individuals in care of teeth and mouth:

Form perception is required to observe calcareous deposits and stains on teeth; and note presence of dental caries.

P-2:14 Develops specifications for, and blows and shapes, glass laboratory apparatus such as test tubes, retorts, flasks, and glass components for such apparatus as condensers, vacuum pumps, barometers, and thermometers:

Form perception is required to see details in customer's sketches and work plans; to observe when specified shape and angles are obtained in glass; to inspect glass visually for flaws and pin holes; and to read measuring instruments such as micrometers and calipers.

P-2:15 Changes undesirable details of illustrations which are to be reproduced by lithographic process:

Observes differences in shading (contrast) when comparing positives and negatives with original copy of illustration layout, and when applying dyes and etching solution. Must perceive details of object or fixture to apply opaque solution and half tone dots by hand; to pencil in highlights and retouch flaws; and to scrape areas to reduce density.

P-2:16 Studies insects and their relation to plant and animal life:

Examines insects for structure, shape, shading, and other characteristics, to identify and classify them according to class, order, family, and species.

P-2:17 Paints decorative designs on objects, such as pottery, cigarette cases, and lampshades, using hand brushes and following design marked on workpiece:

Is able to perceive details of lines traced faintly onto objects to determine outline to follow and shape of areas to be painted in different colors.

P-2:18 Analyzes variety of specifications, lays out metal stock, sets up and operates machine tools, and fits and assembles parts to make and repair metalworking dies, cutting tools, jigs, fixtures, gages, and machinist's handtools, applying knowledge of tool and die design and construction, shop mathematics, metal properties, and layout, machining, and assembly procedures:

Form perception is required to read dial indicators and machine settings; to observe cut as it is made by tool to be sure surface of part is not scored; to inspect workpiece visually and with precision gages to detect surface and dimensional defects; and to check fit of dies and parts.

P-2:19 Serves as member of surgical team in operating room of hospital, performing a variety of duties as either scrub technician or circulating technician:

Is able to differentiate among a variety (30 or more per operation) of surgical instruments and equipment by type, shape, size, and other characteristics.

P-2:20 Repairs radio receivers, phonographs, recorders, and other electronic-audio equipment, using circuit diagrams and test meters:

Form perception is required to inspect visually all circuits and connections for breaks or looseness; to detect defects in components by visual examinations; and to recognize components by their size, shape, and position.

P-2:21 Inspects and tests completed gyroscopes for conformance with operational standards:

Examines metal and glass parts for surface scratches and nicks, position of assembled parts, and bonding or welding of joints; notes mesh of parts during simulation tests; and checks synchronization to detect high spots or unequal gaps which could affect freedom of movement.

P-2:22 Conducts instrumental music groups, such as orchestras and dance bands:

Is able to see difference in shapes and shades and width and length of musical notes, and lines used in musical notation; and to observe symbols indicating changes in instrumentation, meter, tempo, accent, etc., in order to read scores.

P-2:23 Operates telephone switchboard to establish or assist customers in establishing local or long distance telephone connections:

Form perception is required to distinguish between appropriate plug jacks and switches on switchboard and select second cord of pairs and plug them into appropriate jacks, to establish long distance circuits.

Level 3

P-3:1 Grades cured tobacco leaves preparatory to marketing or processing into tobacco products:

Visually inspects and feels leaves to determine their grade according to size and texture, and to detect damage to leaf.

P-3:2 Lays out reference points on structural shapes and plates for fabricating, welding, and assembling into framework for such structures as conveyors, cranes, buildings, and bridges:

Perceives details in blueprints, and checks layout for accuracy.

P-3:3 Sets up and operates X-ray unit to obtain photographs of internal structure of body; assists in fluoroscopic examinations and X-ray therapy; and processes exposed film:

Examines films after development for over or under exposure, movement on part of subject, or processing defects.

P-3:4 Forms sand molds for production of metal castings using handtools, power tools, patterns, and flasks; applying knowledge of variables, such as metal characteristics, molding sand, contours of patterns, and pouring procedures:

Form perception is required to determine appropriate length, width, and posimine appropriate length, width, and position of runners and sprue holes to be cut in mold; and to detect and repair damage to interior surfaces of mold.

P-3:5 Sets up and operates camera to photograph illustrations and printed material and to produce film or glass negatives:

Form perception is required to detect damage to copy; to see errors in negative by comparing with original; to check centering, size, and focus of image on ground glass of camera when setting up; and to examine shading of image during development in order to control image density.

P-3:6 Repairs and services office machines such as adding, accounting, and calculating machines, and typewriters, using handtools, power tools, micrometers, and welding equipment:

Form perception is required to identify machine parts, and to detect defects in parts by their shape and alignment with other parts, when determining type and extent of repairs or service needed.

P-3:7 Inspects assembled watch train (center, third, fourth, and escape wheels with pinions):

Examines alignment and spacing of gears; inspects assembly for cleanliness and oiling of cap jewels; and examines wheels, using loupe, to determine if they are level and in parallel planes.

P-3:8 Covers interior walls and ceilings of rooms with decorative wallpaper or fabric:

Discerns when walls are clean enough to receive new paper and is able to see small holes, indentations, or projections which could affect the appearance of the wall after paper is applied; notes appearance and consistency of paste; observes details of pattern in paper and cuts successive strips so pattern continuity is maintained; aligns paper during application; and matches adjacent edges of successive strips according to the pattern.

P-3:9 Constructs and repairs dental appliances according to prescription:

Form perception is required to recognize irregularities in plaster molds which could affect the fit of subsequent plates or appliances in the patient's mouth; visually to inspect models positioned in articulator to determine that they are in alignment; and to locate and fill in deep undercuts to assure proper fit of denture.

P-3:10 Inspects and assembles machined bomb-fuse parts, using hand and power tools:

Examines machined parts, prior to assembly, for burs and excess metal, using magnifying glass for small parts; and files and grinds off burs and excess metal.

P-3:11 Cuts and trims meat to size for display or as ordered by customer, using handtools and power equipment, such as grinder, curbing machine, and power saw:

Form perception is required to align carcass with blade of saw in order to break down large sections into smaller standard cuts; to examine shape, marbling, fat, and bone to determine most economical means of preparing cuts; to trim fat and bone; and to examine shape and grain to determine cutting line to follow to make standard cuts such as loin roasts, steaks, etc.

P-3:12 Prepares wire-wound coils for assembly in electronic or electrical equipment:

Inspects materials and coils for defects; locates tap wires in wound coils and pulls them out with tweezers and picks; bends wires to specified shape; and solders minute wires together or to terminal lugs.

P-3:13 Inspects eggs to ascertain quality and fitness for consumption or incubation according to prescribed standards:

Form perception is required to detect small differences in size of air cell; to perceive pertinent detail within eggs, such as spots and streaks; and to make comparisons as to mobility, visibility, and shape of yolk shadow.

P-3:14 Verifies accuracy of figures, calculations, and postings pertaining to business transactions recorded by other workers, comparing figures from a variety of forms and records:

Form perception is required to locate forms quickly by their size, shape, and layout; and to go directly to part of form where necessary information is located by examination of page layout.

P-3:15 Operates sewing machine to join or decorate glove and mitten parts:

Form perception is required for making routine visual checks to see that parts are correct size and shape and that material is not faulty; to see that partly assembled gloves have been correctly sewed;

to align parts for sewing; and to ascertain that stitches have properly caught and are uniform.

P-3:16 Inspects glass bottles and glass containers from bottle-making machine, rejects defective ware, and packs selected ware into cartons:

Form perception is required to inspect bottles and detect flaws in glass such as cracks, checks, and splits, and irregularities of shape and size.

P-3:17 Operates battery of looms to weave yarn into cloth:

Form perception is required to make visual inspections of looms prior to and during operation to be sure shuttles are in position and no yarn strands are broken; and to detect mispicks, imperfections in weave, and breaks in warp fibers.

P-3:18 Prepares, seasons, and cooks soups, meats, vegetables, desserts, and other foodstuffs for consumption in hotels and restaurants:

Form perception is required to detect portions of meat which must be trimmed off prior to cooking, or serving; and to carve even proportions.

P-3:19 Tends film cutter and mounting press to mount color-film transparencies;

Form perception is required to detect double exposures and overexposed, blank, or black film.

P-3:20 Tends unit of fresh-work cigar machine that cuts binder leaves:

Discerns the difference in upper and lower sides of tobacco leaves in order to place the proper side on surface or die. Discerns detail of leaf, such as veins and spots in order to position it in a way to get the maximum number of cuts from each leaf.

Level 4

P-4:1 Tends one or more power presses that trim, punch, shape, notch, draw, or crimp metal or plaster stock between preset dies:

Aligns part against stops in press and inspects part for proper length, width, and shape, visually and with fixed gages.

P-4:2 Operates cylinder press to score and cut paperboard sheets into box or container blanks:

Observes alignment of paperboard to adjust feeding and stacking mechanism. Inspects cutting and scoring lines to detect defects.

P-4:3 Performs one or more repetitive bench or line assembly operations, to mass produce products such as automobile or tractor radiators, blower wheels, refrigerators, or gas stoves:

Form perception is required when buffing parts to see when burs are buffed from ends of tubing and proper taper is attained; and to see small bubbles rise to surface of test tank denoting leak in coil, and to locate their source.

P-4:4 Receives, stores, and issues equipment, materials, supplies, merchandise, foodstuffs, or tools, and compiles stock records in stockroom, warehouse, or storage yard:

Examines stock to identify item according to size, shape or other characteristics in order to verify conformance to requisitions or invoice specifications.

P-4:5 Packs agricultural produce, such as bulbs, fruit, nuts, eggs, and vegetables for storage or shipment:

Form perception is required to recognize differences in size, shape, and condition of produce; to pack produce in prescribed pattern according to sizes and shapes; to inspect produce visually for imperfections; and to identify and remove foreign matter.

P-4:6 Sets up knitting machines to knit hose, garments, and cloth according to specifications, and adjusts and repairs machines, using knowledge of machine function:

Visually inspects knitted fabric for number, size, and completeness of stitches, to determine if machine is knitting properly.

P-4:7 Installs control cables to door, window, engine, and flight-control surfaces of airplanes, according to specifications, using wrenches, screwdrivers, pliers, and drills:

Form perception is required to measure

and locate positions for pulleys, guides, and brackets; to thread cable from control levers, through pulleys and guides to mechanism according to specified pattern; and to observe during functional checks to determine necessary adjustments.

P-4:8 Assembles and fastens together wooden parts or assemblies to form sections, frames, or complete articles of furniture:

Observes point of assembly to determine if parts fit properly or if joints must be trimmed with handtools to obtain fit.

P-4:9 Operates pressing machine to smooth surfaces, flatten seams, or shape articles, such as garments, drapes, slipcovers, and hose in manufacturing or drycleaning establishments:

Form perception is required to position articles on press buck (padded table of machine) to insure a smooth press, and to shape articles when positioning; to inspect garments for wrinkles and shape after pressing.

P-4:10 Welds metal parts together, as specified by layout, diagram, work order, or oral instructions, using equipment which introduces a shield or inert gas between the electrode and workpiece to prevent oxidation:

Form perception is required to see details in work diagrams, to align workpiece according to layout markings; to follow line to be welded, to guide torch; and to inspect weld bead for consistent size, straightness, and complete fill of joint.

P-4:11 Picks lemons:

Visually selects lemon by size and shape; determines sizes with sizing loop; and clips off lemons which are large enough, using hand clipper.

P-4:12 Prepares food and serves restaurant patrons at counter or tables:

Form perception is required to position silverware, and condiment containers on tables; to portion and arrange food servings on plates; and to perceive changes in foods during cooking.

P-4:13 Analyzes specifications and controls continuous operation of petroleum refining and processing units, to produce products such as gasoline, kerosene, fuel, and lubricating oils, by such methods as distillation, absorption, extraction, adsorption, thermal and catalytic cracking and reforming, polymerization, isomerization, coking, visebreaking, and alkylation:

Form perception is required to read meters, gages, and recording devices in control room in order to make sure system is in balance and to obtain data for daily log. Must see pertinent detail in graph paper to locate position where lines and figures are to be entered, and to insert paper in recording devices so that stylii are in specified position to start recording.

P-4:14 Doffs bobbins of yarn from spindles of spinning or twisting frames:

Form perception is required to detect yarn breaks after starting spinning frame; to locate yarn ends on bobbins; and to piece yarn breaks.

P-4:15 Folds flatwork pieces discharged from mangle and places articles on table for assembly, observing and returning faulty articles to front of mangle for reironing:

Determines that articles are square, and have not been pulled out of shape, and visually inspects surfaces.

Level 5

No illustrations.

Q — CLERICAL PERCEPTION

Ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation. A measure of speed of perception is required in many industrial jobs even when the job does not have verbal or numerical content.

Level 1

Q-1:1 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields; and solves or directs solution to problems, in various fields by mathematical methods:

Accurately perceives numbers when performing computations, applying methods of numerical analysis, and operating calculators, plotters, or other electrical computation machines in solving problems in support of mathematical, scientific, or industrial research activity, and in analyzing tabular material produced as part of such research.

Q–1:2 Reads and corrects proof while original copy is read aloud:

Clerical perception is required to see details in proof pages such as the way words are spelled, capitalized, hyphenated, and abbreviated; and to detect typographical errors, such as misspelling, wrong punctuation, skips, or repeats.

Q–1:3 Converts symbolic statement of business problems to detailed logical flow charts for coding into computer language and solution by means of automatic data-processing equipment:

Clerical perception is required to perceive pertinent detail in program documentation, assembled data, and recommended program routines; to prepare input, output, and nomenclature lists; to translate step-by-step instructions from flow chart for console operator; to recognize and detect errors in program instructions; to correct errors by altering sequence of steps; and to avoid computation errors.

Level 2

Q–2:1 Performs a variety of clerical duties, such as filing correspondence, records, and reports; typing letters and reports; preparing bills; computing payrolls; compiling reports; addressing, sorting, and distributing mail; taking dictation; tabulating and posting data in record books; keeping inventory records; and giving information:

Clerical perception is required to read, record, and type numbers and names quickly and accurately, to file letters, prepare records and reports, and to post data.

Q–2:2 Records financial transactions of establishment, using bookkeeping machine:

Clerical perception is required to observe detail accurately in verbal and numerical data on invoices, vouchers, sales slips, and other records; to type information onto bookkeeping form in specified place; to be able to perceive differences in numbers when balancing accounts; and to find errors by comparing entries to original documents or records.

Q–2:3 Reviews individual applications for insurance, evaluates the degree of risk involved, and accepts applications, following company's underwriting policies:

Clerical perception is required to compute accurately the value of property and risk involved; to figure premiums using tables and weighted values for risk factors; to note pertinent details in insurance applications and investigation reports; and to read accurately tables and insurance maps, indicating amount and type of insurance used in specific areas.

Q–2:4 Operates machine to perforate paper tape used to control casting type:

Clerical perception is required to read copy and strike keys accurately on keyboard to punch tape; to read tables to determine number of justification keys to punch to justify lines of type; and to read tables avoiding perceptual errors in arithmetic when converting line measures from one unit of measure to another.

Q–2:5 Manages credit and collection department of commercial house, department store, hotel, or similar establishment:

Clerical perception is used to perceive detail in tabular material when reviewing analysis sheets of accounts; to avoid perceptual errors in computation when preparing bad debt forecasts for future periods; and to note pertinent detail in credit applications and investigation reports.

Q–2:6 Receives and pays out money, and keeps records of money and negotiable instruments involved in various bank transactions:

Clerical perception is required to verify totals of transactions; to compare customer's figures with adding machine tape; to avoid perceptual errors in computation when entering figures in bank records or customer's pass books; to verify signatures; and to identify various denominations of bills, drafts, and checks.

Q-2:7 Itemizes and totals customer's purchases in self-service grocery store, using cash register:

Clerical perception is required to read items and prices from price book or list; to perceive accurately prices stamped or marked on grocery items; to record amount on cash register; and to read accurately figures on scale, when weighing items, and on tax table, when determining applicable sales tax.

Q-2:8 Answers inquiries regarding schedules, describes routes, services, and accommodations available, reserves space, and sells tickets for transportation agencies such as airlines, bus companies, railroads, and steamship lines:

Clerical perception is required to read accurately schedules and manuals with route and accommodation information; to make out tickets and passenger lists and to record reservation information; to avoid perceptual errors when reading rate schedules, computing fares and baggage charges, and keeping records of tickets sold, type of accommodations, fares, taxes, and payment.

Q-2:9 Examines and analyzes accounting records of establishment and prepares reports concerning its financial status and operating procedures:

Clerical perception is required to note pertinent detail of numerical entries in ledgers and records; to detect verbal and numerical discrepancies in reports and tables; and to avoid perceptual errors in computations when figuring balances and ratios.

Q-2:10 Analyzes business problems such as development of integrated production, inventory control and cost analysis system, in order to refine its formulation and convert it to a form applicable to an electronic data-processing system:

Clerical perception is required to prepare accurate detailed flow charts for programing; to check accuracy of diagrams to be sure that specific outputs are met; and to avoid perceptual errors when making time and cost estimates for equipment and personnel needed to implement new programs.

Q-2:11 Takes dictation in shorthand of correspondence, reports, and other matter, and transcribes dictated material, using typewriter:

Clerical perception is required for accuracy in typing and in transcribing dictation; and to proofread typed copy.

Q-2:12 Schedules and assigns motor vehicles and drivers (according to availability, length of trip, freight requirements, vehicle capacities and licenses, and user preferences) for conveyance of freight:

Clerical perception is required to accurately compute truck capacities for various products, to estimate delivery time, and charges; to prepare statistical reports on operations, equipment, or personnel; to post data accurately; and to file vouchers, cargo manifests, and other items according to alphabetic and numerical systems.

Q-2:13 Files correspondences, cards, invoices, receipts, and other records in alphabetic or numerical order, or according to subject matter, phonetic spelling, or other system:

Clerical perception is required to check spelling of names or words, order of numbers, and to locate materials in files.

Q-2:14 Performs chemical, microscopic, and bacteriologic tests to provide data for use in treatment and diagnosis of disease:

Clerical perception is required to read laboratory test request slips, to determine patient for whom tests are to be made, type of test, quantities and types of specimens to be taken, and special test instructions; to read words and chemical symbols on laboratory supplies for selection of exact chemical to use in tests; to read reference materials determining type and quantities of reagents to use in analysis; to perceive numbers accurately when performing arithmetic computations for quantitative analyses; to perceive words and numbers accurately when filing test reports, specimens, and other records, according to alphabetical and numerical systems.

Q-2:15 Teaches elementary school pupils academic, social, and manipulative skills in rural or urban communities:

Clerical perception is required to check accuracy of graph, charts, and written materials prepared as lesson aids, and to proofread written exam questions; to perceive spelling, grammatical, and punctuation errors in student papers, and to note computational errors in arithmetic exercises; and to prepare individual progress records.

Q-2:16 Tends machines to twist together two or more strands of yarn or to insert additional twist into single strand of yarn to increase strength, smoothness, and uniformity of yarn:

Clerical perception is required to observe and check machine positions to see that yarn is feeding smoothly from spin bobbins, that it is properly threaded through guides, is under proper tension, and is winding evenly around shipping bobbins.

Q-2:17 Prepares working plans and detail drawings of architectural and structural features of any class of buildings and like structures from rough or detailed sketches or notes and specified dimensions:

Clerical perception is required to perceive numbers accurately when calculating load, stress, and strength requirements for materials, estimating quantities of materials needed and their cost; and to enter dimensions accurately in prints from computations.

Q-2:18 Determines conformance of cloth to weight standards by computing weight per yard of cloth and comparing computations with information on style card:

Clerical perception is required to read identification tag on bolt of cloth, to determine style number, weight, and length; to perceive accurately numbers and markings on slide rule in order to compute weight per yard; to compare computation with standard listed on style card; and to record accurately weight, yardage, weight per yard, and style number for each bolt on production sheet.

Q-2:19 Renders general nursing care to patients in hospital, infirmary, sanitarium, or similar institution:

Notes pertinent detail in written instructions, especially amounts and strengths of medications to administer; accurately perceives numbers when reading instruments, preparing medications, and filling syringes for injections; accurately records data on patients' charts such as temperature, respiration, pulse count, blood pressure, medications and dosage administered.

Q-2:20 Writes sales checks for items sold by salespeople:

Notes price of item or items purchased, stock number and sales clerk number to complete sales check; and avoids perceptual errors when totaling sales check and figuring tax.

Level 3

Q-3:1 Directs the operation of a retail, self-service, food store according to the overall organization policies:

Clerical perception is required to enter figures accurately when preparing merchandise order forms; to verify delivery counts and orders; to compare prices stamped on merchandise with current price list; to compare cash register readings to cash receipts and checker's balance sheets; to avoid perceptual errors in billing prices and preparing financial reports.

Q-3:2 Operates cord or cordless switchboard to provide answering service for clients:

Clerical perception is required to record accurately names, numbers, and instructions given by callers; to locate quickly customer records cards, on which messages

151

are recorded; and to dial telephone numbers accurately.

Q–3:3 Prepares and compiles records in hospital nursing unit, such as obstetrics, pediatrics, or surgery:

Clerical perception is required to post information to patients' charts from doctors' and nurses' notes and laboratory reports; to file charts in chart racks; to make up daily diet sheet for unit; and to maintain inventory of drugs and supplies.

Q–3:4 Repairs and maintains machinery, plumbing, physical structure, electrical wiring, and fixtures of commercial and industrial establishments in accordance with blueprints, manuals, and building codes, using handtools and carpenter's, electrician's, and plumber's tools:

Accurately perceives numbers when reading blueprints and wiring diagrams to determine dimensions, size, or value of components to be repaired or replaced, when reading scales, meters, gages, or other measuring instruments, and when computing values, sizes, or dimensions.

Q–3:5 Drives truck over established route to deliver, sell, and display products or render services:

Clerical perception is required to fill out requisitions for merchandise and to check amounts received against requisition; to prepare sales slips for amounts sold, entering proper amount beside item listed on sales slip; and to avoid perceptual errors when computing total of sales and preparing reports of daily sales and collections.

Q–3:6 Directs sale and distribution of newspapers, books, or periodicals:

Accurately records total number of papers drawn each day and number charged out to each carrier; avoids perceptual errors in computing charges to carriers, recording amount of collections, and posting charges and payments to individual subscriber's ledgers; and maintains accurate copies of subscriber list.

Q–3:7 Plans and directs preparation and service of diets prescribed by doctors:

Clerical perception is required to use charts and tables when making calculations to determine nutritional value of various foods; to calculate quantities necessary to meet required values of minerals, vitamins, protein, etc. specified in diet, and to select a combination of foods which will meet requirements of diet and nutrition while holding other values, such as number of calories, to a minimum.

Q–3:8 Marks or affixes trademark or other identifying information such as size, color, grade, or process code on merchandise, material, or product:

Clerical perception is required to check specification to determine label and other information to be stamped on product; to select appropriate type and other symbols and place them in type box in order; and to compare sample to specification.

Q–3:9 Operates cash register to compute and record total sale and wraps merchandise for customers in department, variety, and specialty stores:

Clerical perception is required to record accurately amount of sale on cash register; to compare sales slip with price tickets on merchandise; and to copy cash register totals onto daily sales and receipt records.

Q–3:10 Services automobiles, buses, trucks, and other automotive vehicles with fuel, lubricants, and accessories:

Clerical perception is required to read meters on gas pumps to record total volume of gas sold; to read price and volume dials on pumps for each individual sale; and to record figures on sales or charge slips; and to perceive figures accurately when reading measuring gages, and tables indicating value or volume of product, such as lubricants, to use for make and model of car being serviced.

Q–3:11 Makes women's garments such as dresses, coats, and suits according to customer specifications and measurements:

Clerical perception is required to read and record figures accurately when taking customer's measurements and fitting garments; and to avoid perceptual errors in computation when making or altering standard patterns to customer's measurements.

Q-3:12 Prepares, seasons, and cooks soups, meats, vegetables, desserts, and other foodstuffs for consumption in hotels and restaurant:

Clerical perception is required to perceive numbers accurately when calculating total quantity of food to prepare and/or order for the day based on quantity per serving and estimates of numbers to be served; and to compute amount of ingredients to use by varying standard recipes according to the number of servings required.

Q-3:13 Assists in care of hospital patients, under direction of nursing and medical staff:

Clerical perception is required to read and record such data as temperature, pulse rate, and respiration rate; to record patient's food and fluid intake and output; and to read charts and instructions accurately.

Q-3:14 Performs combination of duties involved in binding books, magazines, pamphlets, directories, and catalogs:

Clerical perception is required to lay signatures on gathering table in correct page order for assembly; to gather up signatures in numerical order to form complete book body; and to inspect bound book bodies for proper pagination.

Q-3:15 Sets up, adjusts, and maintains one or more machines which cut, draw, form, punch, trim, and finish aluminum and sheet metal products:

Clerical perception is required to make visual inspection of product in comparison to standard model; to adjust meshing of gears and contact of thread rolls; and to check the quality of machine operator's production by checking trial pieces against special gages and sample.

Q-3:16 Sets up, operates, and maintains a battery of blown plastic container machines that automatically blow and form plastic containers from molten plastic:

Clerical perception is required to read gages, controls, and measuring devices accurately, and to make frequent visual and instrument quality inspection checks for specification conformance to weight, thickness, distribution, color, and surface using simple scales, gages, and electronic measuring devices.

Q-3:17 Operates drier, calender, and winding sections of Fourdrinier or cylinder-type paper machines to produce paper and wind it onto rolls:

Clerical perception is required when making visual inspection for any steam leaks in drier; to inspect paper for brightness, dryness, imperfections, and cleanliness; and to check to determine if paper is being guided correctly through rollers.

Q-3:18 Sets up and operates machine which corrugates and faces paperboard to form completed paperboard materials for containers:

Clerical perception is required to make continuous check on quality of paperboard material giving particular attention to such defects as high or low flutes, crushed or cut corrugations, flat spots or low caliper, and soft or wet spots. Checks measurements and computations on work order to determine that they are correct. Checks steam gages and reports to engineer if heat is less than required.

Level 4

Q-4:1 Controls treatment plant equipment to purify and clarify water for human consumption and industrial use:

Clerical perception is required to observe and record meter readings; to maintain records of volume processed; to perceive numbers accurately when computing ratios of elements in water and amount of chemicals to add; and to record results of tests performed on samples.

Q-4:2 Analyzes specifications and controls continuous operation of petroleum refining and processing units to produce products such as gasoline, kerosene, fuel, and lubricating oils, by such methods as distillation, extraction, absorption, thermal and catalytic cracking and reforming, polymerization, isomerization, coking, visebreaking, and alkylation:

Clerical perception is required to read instrumentation settings specified in processing schedules, operating logs, and laboratory recommendations; to make accurate instrument settings; and to observe and record temperatures, pressure, time, vacuum, and other readings on dials, gages, and other monitoring devices.

Q-4:3 Constructs and repairs wooden articles such as store fixtures, office equipment, cabinets, and high-grade furniture, using woodworking machines and handtools:

Clerical perception is required to examine prints and accurately to determine dimensions of parts; to read rules and scales when measuring and making lay out; to avoid perceptual errors in computations when computing dimensions, location of layout reference points, and machine settings.

Q-4:4 Sets up and operates machine tools, and fits and assembles parts, mechanisms, tools, or machines, applying knowledge of mechanics, shop mathematics, metal properties, and layout machining procedures:

Clerical perception is required to note dimensional details in blueprints, to read measuring instruments, gages, or indicators on machines; and to avoid perceptual errors when computing dimensions, location of reference points, and using tables.

Q-4:5 Coordinates and expedites flow of materials, parts, and assemblies within or between departments, in accordance with production and shipping schedules or department supervisors priorities:

Clerical perception is required to compare part of material numbers or identification numbers to identical numbers on shop order when locating items; and to take physical inventories of stock, tool, or equipment storage rooms, comparing inventory number or other identifying number to inventory list.

Q-4:6 Sets up and operates turret lathe to perform series of machining operations, such as turning, facing, boring, and tapping on metal workpieces, such as machine, tool, or die parts, analyzing specifications and deciding on tooling according to knowledge of machining operations:

Clerical perception is required to perceive accurately dimensional details specified in blueprints; to read measuring instruments when checking dimensions; to read dial indicators and other instruments to set machine controls; and to avoid perceptual errors when computing unknown dimensions, machine speed and tool feed-rates, and settings for stops, cams, and levers by which to control rotation of workpiece and feeding of tools.

Q-4:7 Inspects finished glassware or flat glass for conformance to quality standards:

Clerical perception is required to read micrometers and gages accurately determining if dimensions are within specified tolerances; and to record number and types of defects.

Q-4:8 Assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks, and vats, following blueprints and using handtools and power tools:

Clerical perception is required to perceive accurately dimensions on blueprints and numbers on measuring instruments such as master straight edge, squares, and tape measure; and to avoid perceptual errors when computing angles.

Q-4:9 Drives gasoline- or electric-powered industrial truck or tractor, equipped with forklift, elevating platform, or trailer hitch to push, pull, lift, stack, or tier merchandise, equipment, or bulk materials in warehouse, storage yard, or factory:

Accurately perceives identification numbers and weights marked on materials, packing cases, or tote boxes to identify materials to be moved and to assure that weight of items lifted does not exceed vehicle capacity.

Q-4:10 Marks, sorts, and records number and type of soiled garments, linens, and other articles received for cleaning and laundering:

Clerical perception is required to enter number of each type of garment or article on laundry list; to write or stamp identification number or code on article or tag; and accurately to record identification number on laundry slip.

Q-4:11 Cleans, restores, and preserves archeological specimens and historical artifacts according to accepted chemical and physical techniques and training in archeological science:

Clerical perception is required to avoid perceptual errors when computing and measuring amounts of acid, chemical, cleaning, or treating solutions to mix for cleaning articles, prevent further deterioration varying standard formulas according to amount needed.

Q-4:12 Assists workers in a business office by sorting, distributing, and collecting mail and interoffice correspondence and delivering office supplies to workers:

Avoids perceptual errors in reading names and addresses on mail in order to deliver it to the proper destination.

Q-4:13 Sets up and operates coil winding machine to wind coils used in manufacture of electrical and electronic components such as transformers, solenoids, chokes, and filters:

Clerical perception is required to observe counter and to stop machine after specified number of turns; and to read ohmmeter attached to resistance coil, winding or unwinding wire until specified resistance reading is obtained.

Q-4:14 Sells furniture, beds, and mattresses in department store or furniture store:

Clerical perception is required to avoid perceptual errors when making up bills of sales; when reading and recording identification numbers to make up inventory of stock; and when requisitioning stock from warehouse or checking on its availability.

Q-4:15 Sets up and operates metal sawing machines such as hacksaw, handsaw, circular saw, friction saw, and rubber disk saw, to cut metal stock to specified dimension:

Perceives numbers on work order to determine number and dimension of stock to be cut and to measure and set guides; and to record dimensions or identification number from work order to cut stock.

Q-4:16 Repairs defects, such as tears, holes, and missing trim or fasteners, in garments, linens, and curtains by hand or by operating a sewing machine:

Reads sales slip to determine garment to be repaired and dimensions for alterations.

Q-4:17 Sorts incoming soiled laundry into lots, such as flatwear, starchwear, and colored articles, prior to washing:

Clerical perception is required to identify, sort, and count flat articles and garments according to style number; to check number of garments against invoices; to enter count on invoices; to check customer's account file; and to file invoices.

Q-4:18 Performs combination of tasks to produce solid-propellant rocket fuel; prepare rocket motor case for inserting propellant, cast and cure propellant; install propellant and ignition components in motor case; prepare assemby for static testing; and pack assembly for shipment:

Clerical perception is required to accurately insert and align motorcore into motor casing, and to align and bolt retainer rings and nozzle adapter with torque wrenches.

Q-4:19 Assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks, and vats in the field, following blueprints, sketches, and other instructions, and using handtools and power tools:

Clerical perception is used to align and fit structure or plate section to assembled boiler frame or other structure against previously calculated and marked reference points on foundation; and to align and connect tubes to drums and headers.

Q-4:20 Operates a water filtration plant by determining and changing filtration rates, testing water samples, controlling dry chemical machines and chlorinators, observing and recording meter and gage readings, and washing filters when necessary:

Clerical perception is required in noting fluctuations indicated on charts, reading gages, and in making periodic checks of all operating filters to be assured that quality of finished water meets required standards.

Level 5

No illustrations.

K — MOTOR COORDINATION

Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make movement response accurately and swiftly.

Level 1

No illustrations.

Level 2

K-2:1 Types letters, reports, stencils, forms, addresses, or other straight copy material from rough draft or corrected copy:

Eye-finger coordination is required to type by "touch", with the fingers striking the appropriate keys as the eyes follow the copy.

K-2:2 Itemizes and totals cost of customer's purchases of groceries, meat, and produce on a combination adding machine-cash register:

Motor coordination is required to coordinate finger, eye, and hand with speed.

K-2:3 Diagnoses and treats diseases, injuries, and malformations of the teeth, gums, and related oral structures:

Motor coordination is essential in using drills and other dental tools to extract, fill, or cap teeth; in positioning novacaine needle in gums; and in fitting artificial teeth, plates, and bridges.

K-2:4 Creates designs and prepares patterns for new types and styles of men's, women's, and children's wearing apparel:

Motor coordination is required in sketching and drawing outline of pattern on printed form; in cutting out drawings with scissors to make pattern for experimental garment; and in draping, fitting, and constructing garments.

K-2:5 Renders general nursing care to patients in hospital, infirmary, sanitarium, or similar institution:

Coordinates vision and finger and hand movements to give injections with hypodermic needle, medication, position or remove dressings, and to measure medicines.

K-2:6 Cuts and styles hair using clippers, comb, and scissors, and performs other personal services for patrons of barber shop:

Coordinates eye and hand movements to manipulate electric and hand clippers, scissors, and other barber tools in cutting and shaping of hair; shampooing of hair; and in giving scalp and facial massages.

K-2:7 Prepares clear, complete, and accurate drawings of buildings and related structures:

Close correspondence between eyes and fingers is required to position triangles, T-squares, and other drafting tools; to draw or sketch the design, verifying its dimensions with ruler; and to ink in all lines and letters on pencil drawings as required.

K-2:8 Sorts agricultural produce working as crew member on conveyor belt:

Eye and finger coordination is required to work at a production line pace in segregating produce according to color, grade, and size; and to identify and discard any foreign material which does not belong.

K-2:9 Computes and records statistical, accounting, and other numerical data, using machine that automatically performs mathematical operations:

Motor coordination is required for coordinating eyes and fingers when entering numerical data from machine, and for manipulating pencil and thumbing through forms, tables, and reports.

K–2:10 Operates pantograph machine to transfer design in reduced form from zinc plate to varnished printing rollers:

Coordination between eyes and fingers is required in guiding needle point through line of design cut on plate to trace pattern on printing roll; and for moving stylet to follow colored lines in etched pattern.

K–2:11 Performs dental prophylactic treatments under supervision of licensed dentist:

Motor coordination is essential in taking and developing X-rays, mixing compounds, preparing solutions, polishing teeth, and massaging the gums.

K–2:12 Pairs finished hose according to grade, color, size, and length:

Holds heel at bottom seam and measures heel and length of stocking by holding against measuring lines on pairing table to ascertain specific lengths, matches or pairs stocking on top of another to match two stockings that are identical in heel, length and welt measurements. Works at production pace; and coordination of eyes, hands, and fingers is required for measuring and matching.

K–2:13 Treats patients in disabilities, disorders, and injuries to relieve pain, develop or restore function, and maintain maximum performance, using both physical and electrical means:

Coordinates eye and hand movements in positioning therapeutic equipment to affected body parts of patient; in applying moist packs; and in manipulating wheelchairs, braces, canes, crutches, and other prosthetic devices.

K–2:14 Installs, repairs, adjusts, and calibrates pneumatic electrical, and electronic instruments:

Motor coordination is required in using handtools to adjust or repair component parts of electronic instruments; to test and calibrate reassembled equipment with electrical testing devices; and to rewire and modify equipment in accordance to blueprints and schematics.

K–2:15 Works at discharge end of conveyor belt to inspect and box bakery products:

Motor coordination is required to remove products quickly from belt and place them in cartons according to specified arrangement.

Level 3

K–3:1 Operates looping machine to close openings in toe of seamless hose or join knitted garment parts:

Close coordination between eyes and fingers is required to place cone of yarn on spindle, to thread yarn through tension guides and eye of needle.

K–3:2 Operates telephone switchboard to establish or assist customer in establishing local or long distance telephone connections:

Motor coordination is required to press proper keys or plug jacks into holes or slots on switchboard quickly in response to visual stimuli or lights on board, and often with several calls coming in and going out simultaneously.

K–3:3 Operates semiautomatic machine to produce photographic prints:

Motor coordination is necessary to place envelopes and photographic paper under the numbering machine, to strike the numbering machine when material has been centered, and to select proper exposure-time button after the visual determination is made.

K–3:4 Assembles electrical equipment, such as ammeters, galvanometers, and voltage meters:

Close correspondence is required between eyes and hands in using tools to position, adjust and tighten parts, such as screws, indicator arms, springs, and lugs.

K–3:5 Performs beauty services for patrons of beauty shop:

Coordination of eyes, hands, and fingers is required to cut, style, and tint hair, give facials, arch eyebrows, and manicure nails.

157

K–3.6 Operates machine to cast complete lines of type from type metal and deposit them in galley in composed form for printing:

Concentrated coordination of eyes, fingers, and hands is required to adjust marginal stops and gages regulating length and thickness of lines to be cast; to read copy and press keys of keyboard to select matrices of letters from magazine; and to move levers to cast line and deposits it in galley when line is complete.

K–3:7 Drives gasoline powered fork-lift truck to haul or stock materials and/or objects in or about an establishment:

Coordinates eyes and hands or fingers in making precise movements with speed (pushing and pulling hand levers, gear shifts, hand brakes) to drive truck and to raise, lower or otherwise position fork-lift under objects to be moved.

K–3:8 Removes defective nuts and foreign matter from bulk nut meats:

Coordinates hand and finger movements to pick up and discard defective nut meats and foreign matter from conveyor belt, working at production rate.

K–3:9 Operates electrically powered derrick to lift and move heavy objects:

Motor coordination is required to observe hand signals and simultaneously operate two sets of independent controls which manipulate both ends of the material in response to these signals.

K–3:10 Presses articles, such as drapes, knit goods, millinery parts, and other garments using hand iron:

Motor coordination is required in turning garments inside out; in laying garments on pressing table to facilitate pressing of various portions of the garment; in smoothing wrinkles and straightening pleats or gathers, and in folding garments evenly.

K–3:11 Cuts, trims, and bones meat to prepare them for cooking, using knives, saw, and cleaver:

Motor coordination is required in adjusting saw blades; in cutting, boning, and trimming meats into desired portions with knives; and placing meat in grinders and cubing machines.

K–3:12 Tends unit of fresh cigar machine that cuts binder leaves:

Coordinates and times work movement with those of worker on opposite side of machine. Uses movements of hand and fingers in smoothing and positioning tobacco leaves on dies constantly observing the leaf and positioning it in a manner to get maximum number of cuts.

K–3:13 Assembles cells and other components in battery case to make complete storage battery:

Eyes and hands must function in constant coordination and at assembly line pace in placing paper liner over battery can with left hand while picking up battery core from a conveyor with right hand; inserting core into battery can, forcing liner under and around core; and placing filled cans onto conveyor.

K–3:14 Assembles metal products, such as vacuum cleaners, valves, or hydraulic cylinders, partially or completely working on bench or on shop floor:

Motor coordination is required in operating drill presses, punch presses, riveting machines, and various handtools in assembly operations; and in positioning, placing, and fitting of parts in each sub-assembly and main assembly.

K–3:15 Applies coats of plaster to interior walls, ceilings, and partitions of buildings to produce finished surface:

Motor coordination is essential in erecting scaffolding; mixing plaster to desired consistency; spreading plaster so as to attain uniform thickness; and in creating decorative textures in finished coat by marking with brush or trowel.

K–3:16 Repairs and rebuilds upholstered furniture, using handtools and knowledge of fabrics and upholstery methods:

Motor coordination is required to tack cardboard, padding, and covering material to correct points of the frame.

158

K–3:17 Tends one or more steam hydraulic presses to mold records from shellac compounds:

Motor coordination is required to position bottom label record; load plastic disc; and position top label record, simultaneously checking alignment with press.

K–3:18 Forms wire grids used in electron tubes, using winding, shaping, and cutting machines:

Motor coordination is required to coordinate eyes and fingers or hands to insert grid into chucks, to trim the grids, and to thread the wires through lathe.

K–3:19 Tends variety of machines that assemble light bulbs:

Motor coordination is required to examine machine conveyors for jammed or defective parts when signal indicates stoppage and to remove them with tweezers; to join glass bulbs and insert mount in bulb; to insert and arrange wire through neck of bulb as bulb passes on conveyor to boring machine.

K–3:20 Welds metal parts together, according to layouts or blueprints, using any number of welding processes,

Effective coordination of eyes and hands is required in using welding equipment; handling pieces to be welded; and fitting component parts of assemblies together.

K–3:21 Sets up and operates metalworking machines and uses handtools to shape patterns from rough metal stock:

Motor coordination is required in setting up, and adjusting machines; and in using handtools and precision measuring devices to produce patterns of required dimensions.

K–3:22 Interviews public and compiles statistical information on topics, such as public issues and consumer buying habits:

Eye-hand coordination is needed to record data on standard forms or in notebooks while interview is in progress.

K–3:23 Surveys earth's surface and oversees engineering survey party engaged in determining exact location and measurements of points, elevations, lines, areas, and contours to secure data used for construction and mapmaking:

Eye-hand coordination is necessary to maintain accuracy and proper alignment of surveying equipment; and to keep accurate notes, records, and sketches of work performed.

Level 4

K–4:1 Assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks, and vats, in the field, following blueprints and using handtools and power tools:

Motor coordination is required to use hands as directed by the eyes in aligning and fitting structures or plate sections in assembling boiler frames; and in shop sketching and drafting.

K–4:2 Repairs defects, such as tears and holes in garments, linens, curtains, and draperies, and rebinds cleaned blankets by hand or by operating a sewing machine:

Eye and finger coordination is required in sewing, darning, or reweaving holes or tears in garments, curtains, or linens.

K–4:3 Reads typescript or proof of type setup to detect and mark for correction any grammatical, typographical, or compositional errors:

Motor coordination is required to coordinate eyes and fingers in making proofreader's marks.

K–4:4 Performs tasks to finish and press household linens:

Motor coordination is required in placing garments into machine, making sure garments are properly aligned so that no wrinkles will be ironed into garments.

K–4:5 Sets up and operates machine tools, and fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines:

Motor coordination is required to align workpiece and cutting tool in relation to one another; to move levers when operating machines; and in using handtools to perform such functions as chipping, filing, and scraping.

K-4:6 Analyzes specifications and controls continuous operation of petroleum refining and processing units to produce derivative products:

Motor coordination is required to adjust instruments while reading scales on control panel and to set control arms and needles in proper recording positions.

K-4:7 Assembles various aluminum or steel components of trailers:

Motor coordination is required to align and position trailer components to fit rivets, bolts, and screws into position, using riveting gun and handtools, and to fit trailer parts in prescribed position for correct assembly.

K-4:8 Receives, stores, and issues equipment, material, supplies, merchandise, foodstuff, or tools, and compiles records in stockroom, warehouse, or storage yard:

Eyes, hand, and finger movements must be coordinated to wrap or box items, and label packaged parts.

K-4:9 Harvests fruit, working as crew member:

Coordinates hands and eyes to make necessary movements in selecting, picking, and depositing fruit into picking sack.

K-4:10 Keeps physical structure of factory building, school building, apartment house, church, or similar structure in good repair:

Motor coordination is required to use handtools in replacing defective electrical switches and fixtures, in repairing woodwork and plumbing fixtures, and in painting structures.

K-4:11 Operates traveling and stationary tables to feed steel blooms, billets, and slabs to rolls for successive passes through roll stands:

Eye-hand coordination is required to position tables and align rollers preparatory to feeding steel into rollers.

K-4:12 Keeps premises of commercial establishment, office building, or apartment house in clean and orderly condition:

Eye-hand coordination is essential when manipulating equipment for cleaning, such as brooms, mops, and sweepers; and when dusting, scrubbing, and polishing surfaces.

Level 5

No illustrations.

F — FINGER DEXTERITY

Ability to move fingers, and manipulate small objects with fingers, rapidly or accurately.

Level 1

F-1:1 Plays organ in recital, as accompanist, or as a member of orchestra, band, or other musical group:

All ten fingers must be positioned in rapid integrated movements to depress specified keys at varying tempos on one or more keyboards of an organ.

F-1:2 Performs surgical operations upon human body:

Finger movements of one hand are required to locate broken or cut blood vessel, to position vessel and place ligature about it, and to tie one of several types of knots in ligature to stem flow of blood from vessel.

Level 2

F-2:1 Sets up and operates coil-winding machine to wind multiple coils used in manufacture of electrical and electronic components:

Positions and moves very small parts and thin wires with fingers and fits coil forms on winding arbor of machine; threads wire through guide mechanism of machine; and tapes wire to coil forms.

F-2:2 Adjusts watch movements to comply with mechanical and timing specifications:

Controls placement and movement of watchmaker tools and watch components with fingers in disassembling and cleaning watch movements; in adjusting lock, drop, and slide of escapement; in truing wheel and hairspring assembly; and in reassembling watch movements.

F-2:3 Sorts, records, and proves records of bank transactions, such as checks, deposit slips, and withdrawal slips, using proof machine.

Controlled finger movements are required to operate keyboard of proof machine in order to sort items into various categories and list them on master control and individual batch tapes.

F-2:4 Installs optical elements, such as lenses, prisms, and mirrors in mechanical portion of such instruments as telescopes, cameras, and gunsights:

Finger dexterity is required to guide and move tools and to position component parts in performing such tasks as scraping, filing, and lapping instrument mounts to align optical elements; adjusting optical elements to calibrations; and inserting retaining rings into housings and securing them to posts or threads.

F-2:5 Entertains audience by performing sleight-of-hand tricks:

Finger dexterity is essential in performing tricks that involve picking specific cards out of deck; pulling objects from sleeve, jacket, or hat; and removing objects, such as watches and wallets, from members of audience without their knowledge.

F-2:6 Assembles modules (units) of microelectronic equipment, such as satellite communications devices and hearing aids, using handtools, magnifying lens, and spotwelder:

Finger dexterity is required to insert lead wires of components, such as microdiodes, resistors, capacitors, and microtransistors, into mounting holes of plastic plate; and to attach color-coded wires between specified component leads to make circuit connections.

F-2:7 Engraves lettering and ornamental designs on silverware, trophies, eyeglass frames, and jewelry, using engraving tools:

Finger dexterity is required to position and control movements of engraving tools in cutting complicated designs on objects, such as pins, rings, and bracelets.

F-2:8 Performs chemical, microscopic, and bacteriologic tests to provide data for use in treatment and diagnosis of disease:

Finger dexterity is required to use fingers to tie tourniquet about upper arm, locate vein below tourniquet near surface of skin; insert needle into vein; release tourniquet; and withdraw plunger of syringe to obtain amount of blood required for type of test to be performed.

F-2:9 Packages pharmaceutical products by hand:

Finger dexterity is required in performing such tasks as inserting cotton in mouths of bottles, placing caps on bottles, pasting labels on bottles, inserting bottles into nested cartons, placing printed material in filled cartons, and packing individual cartons into larger cartons.

F-2:10 Operates single- or multiple-needle sewing machine to join parts in the manufacture of such products as awnings, carpets, gloves, hats, textile bags, and upholstery:

Finger dexterity is required to draw thread through machine guides, tensions, and needle eyes; and guide parts under needle, following edges, seams, or markings.

F-2:11 Operates 10-bank manual or electric calculating machine to perform computations necessary for accounting and statistical activities:

Finger dexterity is required to operate keyboard of calculating machine.

F-2:12 Applies electronic theory, principles of electrical circuits, electrical testing procedures, engineering mathematics, physics, and related subjects to layout, build, test, troubleshoot, repair, and modify developmental and production electronic equipment, such as computers, missile control instrumentation, and machine tool numerical controls:

Finger dexterity is required to perform such tasks as assembling experimental circuitry and prototype models and adjusting, calibrating, aligning, and modifying circuitry and components.

F-2:13 Operates looping machine to close openings in toe of seamless hose or join knitted garment parts:

Finger dexterity is required to thread yarn through tension guides and eye of needle and to set loops and looping points.

F-2:14 Makes women's garments such as dresses, coats, and suits, according to customer specifications and measurements:

Finger dexterity is required in performing such tasks as positioning and pinning pattern sections and fabric; pinning or tion for sewing; and threading needle and sewing parts together by hand.
basting together fabric parts in prepara-

F-2:15 Diagnoses and treats diseases, injuries, and malformations of teeth, gums, and related oral structures:

Finger dexterity is required to position and guide dental picks and mirrors; position X-ray film in patient's mouth; suture extraction wounds; and trim and carve bite blocks with spatulas and carving instruments.

F-2:16 Attaches hands to faces of watches:

Finger dexterity is required in positioning watch movement in holding fixture of hand staking tool; in positioning hour, minute, and second hands on their respective pinions with tweezers; in bending tips of hands with tweezers to make them conform to curvature of dial.

Level 3

F-3:1 Feeds tungston filament wire coils into machine that mounts them to stems in electric light bulb:

Finger dexterity is required to grasp coils with tweezers and insert them into slotted plate of mounting machine; and to pick up and examine finished mounts as they emerge from machine.

F-3:2 Plans architectural and structural features of buildings:

Finger dexterity is required in making rough sketches and detail drawings, employing drafting instruments such as protractors, triangles, compasses, rulers, and straight edges.

F-3:3 Operates tabulating machine that processes data from tabulating cards into printed records:

Finger dexterity is required to pick up ends of wires and plug them into proper holes in tabulating machine plugboard; to position, check, and select cards to be tabulated; and to make fine adjustments in replacing or setting machine parts.

F-3:4 Tends one or more steam-hydraulic presses that mold heated biscuits (vinyl squares) into phonograph records:

Finger dexterity is required in folding heated biscuits on steamtable; slitting an opening in center of biscuit with knife; centering biscuit and record label on press bed spindle; removing molded record and mounting it on trimming machine; and picking up and examining record for defects.

F-3:5 Operates automatic lathe to wind fine wire around two heavier parallel wires to fabricate electronic grids:

Finger dexterity is required to manipulate grid wires which are .0005 inches to .04 inches in diameter without causing distortion. (Distortion of the hair-like lateral grid wires is the greatest obstacle the operators have to overcome in learning the job.)

F-3:6 Takes dictation in shorthand and transcribes dictated materials, using typewriter:

Finger dexterity is required in forming shorthand symbols with pencil or pen and in depressing keys of typewriter.

F-3:7 Installs, maintains, and services sound and communication systems:

Finger movements are required in performing such tasks as picking up and installing tubes, transistors, and component parts; wiring units of system together; and turning dials to obtain required performance level.

F-3:8 Cuts and styles hair using clippers, comb, and scissors and performs other personal services for patrons of barber shop:

Controlled movement of fingers is required to use clippers, scissors, and other barber tools when cutting and shaping hair.

F-3:9 Operates battery of looms to weave yarn into cloth:

Finger dexterity is required to repair breaks in warp fiber by tying piece of yarn to broken end of warp and threading yarn through drop wires, needle eyes, and reed dents, using reed hooks.

F-3:10 Folds garments for bagging and boxing following guide marks on table or using folding board (cardboard or metal form):

Finger dexterity is required to fasten buttons, attach tags to dresses, tie sashes and bows, and insert pins to hold folds in place.

F-3:11 Changes details of illustration copy which is to be reproduced by lithographic process:

Finger dexterity is required to scrape small areas of negative with knife or razor blade to reduce density; draw straight or curved line corrections with drafting instruments; apply opaque with brush; and retouch flaws with pencil.

F-3:12 Constructs and repairs dental appliances:

Finger dexterity is required in performing such tasks as sketching outline of appliance on stone model, aligning model on articulator and securing it to frame with plaster, and building wax impressions of metal frames, crowns, partials, and full dentures.

F-3:13 Packs agricultural produce, such as bulbs, fruits, nuts, eggs, and vegetables, for storage or shipment:

Finger dexterity is required in performing such tasks as lining containers with padding, inserting separators in containers, sorting produce according to size and color, wrapping material around produce, and placing produce in containers.

F-3:14 Welds metal parts together, using electric and oxyacetylene welding equipment:

Finger movements are required to connect pressure regulators to nozzles of oxygen and acetylene supply tanks; connect hoses to regulators and welding torch to hose; screw welding tip into torch; and to open regulator valves and light torch.

F-3:15 Plans layout and installs and repairs wiring, electrical fixtures, apparatus, and control equipment:

Finger dexterity is required to bend, position, and splice wires; thread wire through circuits; connect wiring to lighting fixtures; and connect power cables to equipment.

F-3:16 Removes stems from tobacco leaves by hand:

Finger dexterity is required in stripping leaf from stem, in spreading and stacking wrapper leaves in piles, and in placing filler tobacco and stems in box or can.

F-3:17 Operates pressing machine to smooth surfaces, flatten seams, and shape articles, such as garments, drapes, slipcovers, and hose, in manufacturing or drycleaning establishment:

Finger dexterity is required to pick up articles, position articles on buck (padded table of machine), and hang pressed articles on hangers.

Level 4

F-4:1 Sets up and operates grinders, curve generators, and polishers and performs hand operations to fabricate lenses, optical flats, and other precision optical elements for optical instruments, such as telescopes, microscopes, aerial cameras, and military optical systems, or for use as standards:

Finger dexterity is required to position and turn blanks of optical glass against gridding wheels and laps; block work in plaster and other compounds in preparation for fine grinding; cement lens element together; and mount optical elements in holders in preparation for installation into optical instruments.

F-4:2 Mixes and bakes ingredients according to recipes to produce breads, pastries, and other baked goods.

Finger dexterity is required to work with ingredients and utensils and to perform such tasks as arranging strips of dough across tops of pies, and placing cut or formed dough in pans or on baking boards or trays.

F-4:3 Injects prepared bull semen into cow's vagina:

Finger dexterity is required to move plunger of breeding syringe to draw semen specimen into syringe, in cleaning cow's vulva with antiseptic solution, and in inserting syringe into cow's vagina and depressing plunger to inject seminal fluid.

F-4:4 Receives, stores, and issues equipment, material, supplies, merchandise, foodstuff, or tools and compiles records in stockroom, warehouse, or storage yard:

Finger dexterity is required to pick up variety of items carried in stock and to place them in containers and on storage shelves.

F-4:5 Prepares, seasons, and cooks soups, meats, vegetables, desserts, and other foodstuffs for consumption in medical institutions:

Finger dexterity is required in using knives, brushes, scrapers, and other tools to clean, trim, slice, and dice vegetables, fruits, and meats; in portioning foods; in turning dials and valves on kitchen equipment; in removing dishes, napkins, and waste materials from food carts; in sorting and stacking dishes; and in lining pans and shelves with paper.

F-4:6 Sews fasteners and decorative trimmings to articles, sews buttonholes, and joins articles, using needle and thread:

Finger dexterity is required to thread needle, align articles, and hold articles in place while sewing.

F-4:7 Coordinates and expedites flow of material, parts, and assemblies within or between departments in accordance with production and shipping schedules or department supervisor's priorities:

Finger dexterity is required in performing such tasks as obtaining required items from stock and carrying them to job site and in handling items and making entries on inventory sheet when taking physical inventories of stock on hand.

F-4:8 Picks lemons:

Finger dexterity is required in positioning sizing loop over lemons, using clipper to cut lemons from tree and placing lemons in nested box.

F-4:9 Shakes, sorts, and folds laundry; ties bundles, and attaches identifying tags.

F-4:10 Controls continuous operation of petroleum refining and processing units:

Finger dexterity is required to move knobs, buttons, and switches on control panels; to place charts, tapes, and graphs in recording part of instruments; and to set control arms and needle points in proper recording positions.

F-4:11 Doffs bobbins of yarn from spindles of spinning or twisting frames:

Finger dexterity is required to press buttons to start and stop frames and to thread ends of yarn through traveler and guides.

F-4:12 Interviews job applicants in employment agency and refers them to prospective employers for consideration:

Finger dexterity is required to perform such tasks as filing applications of persons qualified for job openings; recording information taken from applicants and employers, using pencil, pen, and/or typewriter; and demonstrating aptitude tests, such as those for manual dexterity, finger dexterity, and motor coordination, before administering tests to applicants.

F-4:13 Collects admission tickets and passes from patrons at entertainment events:

Finger dexterity is required to take tickets from patrons, tear tickets in half, and return stubs to patrons.

F-4:14 Repairs and maintains physical structures of commercial and industrial establishments, using hand and power tools:

Finger dexterity is required to perform such tasks as making electrical repairs that involve splicing broken lines; installing switches, receptacles, and junction boxes; and replacing fuses.

F-4:15 Displays and sells furniture in retail store:

Finger dexterity is required to pull out drawers, adjust mirrors, write sales slip with pencil, and position charge plate in machine to obtain customer's name and address.

Level 5

No illustrations.

M — MANUAL DEXTERITY

Ability to move hands easily and skillfully. To work with hands in placing and turning motions.

Level 1

No illustrations.

Level 2

M-2:1 Entertains audience by juggling and balancing objects:

Manual dexterity is required to throw, catch, handle, and balance three to five objects such as balls, knives, tenpins, and chinaware.

M-2:2 Creates and interprets music on violin to entertain audience:

Placing and turning movements are required to draw bow over strings. Wrists of both hands must be flexible to hold violin in position with one hand, and to draw bow strings with other hand.

M-2:3 Installs, repairs, maintains, and adjusts indicating, recording, telemetering, and controlling instruments used to measure and control variables, such as pressure, flow, temperature, motion, force, and chemical composition, using handtools and precision instruments:

Assembly, disassembly, and calibration of instruments require placing and turning movements of the hands. Works with handtools such as screwdrivers, wrenches, pliers; and bench tools such as jeweler's lathe, pin vises, small buffer grinders and ultrasonic cleaners in repairing instruments.

M-2:4 Inspects eggs to ascertain quality and fitness for consumption or incubation, according to prescribed standards:

Manual dexterity is required to pick up eggs from cardboard cases; roll and shift eggs within palm while inspecting them; and place acceptable eggs on shuffler rack while working at production line pace.

M-2:5 Fabricates, assembles, installs, and repairs sheetmetal products and equipment, such as control boxes, drainpipes, ventilators, and furnace castings, according to job or blueprints:

Manual dexterity is required to manipulate such tools as outline cutting torches, power hacksaw, slitting shear, and various hand drills to accomplish general work processes as cutting, forming, folding, grooving, bending, punching, and drilling holes; and to place workpiece in holding fixture, operate tool, and remove workpiece from machine.

M-2:6 Assembles metal products, such as vacuum cleaners, valves or hydraulic cylinders, partially or completely, working on bench or on shop floor:

Assembly of metal products requires placing and turning hand movements to position and fit parts in each sub-assembly and to position and fit assembled components into main assembly. Manipulation of handtools is essential to assembling the product.

M-2:7 Performs dental prophylactic treatments under supervision of licensed dentist and instructs groups and individuals in care of teeth:

Manual dexterity is required in using instruments and materials to clean and polish teeth; and in massaging the gums. Placing and turning hand movements are essential to take and develop X-rays; mix filling compounds; prepare solutions; and to sterilize instruments.

M-2:8 Constructs and repairs metal-forming tools, dies, jigs, fixtures, and gages, shaping the parts with various metal-working machines and fitting them together using handtools:

Manual dexterity is required in setting up machines; in building tool holding devices; in fitting and assembling tools, gages, and other mechanical equipment; and in performing such tasks as chipping, filing, scraping, and polishing surfaces of mechanical parts.

M–2:9 Sets up and operates drum-type machine to build pneumatic automobile tires according to specifications:

Manual dexterity is required in handling, placing, and guiding product components and tools in the process of tire building; in applying cement stick to drum; tearing the measured length of ply stock from roll and wrapping ply around drum; in guiding stock while drum is rotated; lapping ends of ply; and smoothing tight splice.

M–2:10 Diagnoses and treats diseases, injuries, and malformations of teeth, gums, and related oral structures:

Accurate and flexible wrist movements are required when using drills and other dental tools to extract, fill, or cap teeth; positioning novacain needle in gums; and fitting artificial teeth, plates, and bridges.

M–2:11 Solders together components of metal products on production line, using hand soldering iron and soft solder:

Uses hands to pick up, grasp, position, align, and solder together components of metal products while maintaining production line pace in all operations.

M–2:12 Controls and extinguishes fires, protects life and property, and maintains equipment as volunteer or employee of city, township, or industrial plant:

Manual dexterity is required during emergency situations, in positioning ladders, and nets; connecting hoses; clasping rungs to climb ladders; and in giving artificial respiration.

M–2:13 Works at a conveyor belt to package previously filled bottles, tubes, and boxes of pharmaceuticals by hand in individual or nested cardboard boxes:

Uses placing and turning hand movements in putting empty containers on conveyor belt; removing filled packages from conveyor; and packaging smaller containers in larger packages while maintaining a continuous production pace in all operations.

M–2:14 Covers baked goods with icing or frosting by hand:

Manual dexterity is required in spreading icing over surfaces of baked goods with spatula; in filling and icing layer cakes; in applying glaze or thin icing to sweet rolls; in rolling dough; and in handling trays and other items.

M–2:15 Services automobiles, buses, trucks, and other automotive vehicles with fuel, lubricants, and accessories:

Manual dexterity is required to manipulate hose while pumping gas, cleaning windows, and washing cars; and in handling tools and equipment to perform services, such as testing, cleaning, and installing batteries, tires, sealed beam units, thermostats, and fan belts.

M–2:16 Cuts and trims meat to size for display or as ordered by customer:

Manual dexterity is necessary in operating and cleaning machines, cutting and placing meat in grinder and cubing machines.

Level 3

M–3:1 Distributes letter mail in racks segregated according to zone number, station, carrier number, or company name:

Rapidly picks up faced mail from ledge, grasping single letter in hand, noting address, placing letting in proper slot in rack; and repeating action until batch is sorted.

M–3:2 Repairs and rebuilds upholstered furniture, using handtools and knowledge of fabrics and upholstery methods:

Manual dexterity is required in using handtools, in handling and assembling spring units, in building up and securing padding, and in handling, positioning, and securing covered material.

M–3:3 Inspects unfinished hose for defects and conformance to specifications:

Constant wrist bends are used to pull stocking over form and revolve form with both hands to inspect all areas of stockings.

M–3:4 Sets up, inspects, and repairs looms to weave cloth:

A variety of hand and wrist movements are required to adjust screws and levers, install gears, tighten bolts, and to repair and replace various mechanical parts of machine.

M–3:5 Places cores of dry batteries in battery cans, preparatory to sealing:

Inserts bottom spacers in dry battery cans with left hand and inserts cores with right hand. Uses left hand constantly in twisting and turning motion to reach and grasp spacers, coordinating this with right-hand movements to place and center cores in sprockets. Continuously uses both hands in turning, placing movements to joggle spacer bars and turn sprockets.

M–3:6 Drives gasoline- or electric-powered industrial truck, equipped with fork lift, to push, pull, lift, stack, or tier equipment in warehouse, storage yard, or factory:

Manual dexterity is required to push and pull levers on truck, turn steering wheel, and stack materials on truck.

M–3:7 Lays out and fabricates metal structural parts, such as plates, bulkheads, and frames, and braces them in position within hull of ship for riveting or welding:

Manual dexterity is required to manipulate handtools in dismantling, repairing, and rebuilding damaged sections of ship, and is essential in fabricating, assembling, and testing watertight doors and hatches.

M–3:8 Operates sewing machine to stitch open edges of foot, leg, and welt of full fashioned hose:

Uses hands in threading machine; guiding thread through tension devices and guides; uncurling selvages and matching edges into position; and in guiding stocking into machine.

M–3:9 Treats patients with disabilities, disorders, and injuries to relieve pain, develop or restore function, and maintain maximum performance, using physical means, such as exercise, massage, heat, water, or light:

Manual dexterity is needed to position, adjust, and operate treatment equipment; to assist patient in transfer activities and ambulation; to position and drape patient for treatment; and to massage and exercise patient's affected part.

M–3:10 Tends machine that coats continuous rolls of wire, strips, or sheets with wax, paint, rubber, asphalt, or other coating material:

Manual dexterity is required in handling control levers; guiding strips into machine and onto rewind coils; repairing broken splices by hand; and in using small handtools to change degreasing pads and squeeze rollers.

M–3:11 Cuts cheese, wraps pieces in foil, and packs them in boxes:

Manual dexterity is required to cut cheese into disks, using a wire with a handle at each end.

M–3:12 Tends machine to peel and core apples:

Manual dexterity is required for reaching into bin containing graded apples, and placing them stem side up into cups of machine.

M–3:13 Assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks, and vats in the field, following blueprints and using handtools and power tools:

Uses placing and turning hand movements in aligning and fitting structures or plate sections in assembling boiler frames; in handling plumb bobs, levels, wedges, dogs, and turn buckles; and in riveting, welding, and caulking.

M–3:14 Prepares, seasons, and cooks soups, meats, vegetables, desserts, and other foodstuffs for consumption in hotels and restaurants:

A variety of hand and wrist movements are used in working with utensils, apparatus, and foodstuffs.

M–3:15 Welds metal parts together, using either electric arc or oxyacetylene welding equipment to melt both the metal edges to be joined:

Manual dexterity is required for rapid handling of pieces to be welded; for fitting component parts of assemblies together, and for effective use of hands and arms in using welding equipment.

M–3:16 Provides beauty services for customers:

A variety of hand and wrist movements are used in cutting hair with scissors or razor; winding hair on curlers; massaging face or scalp; and combing and brushing hair.

M–3:17 Sorts and segregates fruit, working as a crew member:

Manual dexterity is required to place liners in boxes; grasp fruit and paper, and wrap the fruit; and pack wrapped fruit in proper position in container.

M–3:18 Renders general nursing care to patients in hospital, infirmary, sanitorium, or similar situation:

Manual dexterity is required to move, transport, lift, turn, position, dress, and otherwise handle patients; make beds; push food carts; and perform general cleaning tasks; handle equipment and instruments; and store supplies in designated places in stockroom.

M–3:19 Operates electrically powered sewing machine to sew cotton garments:

Continuous turning and placing movements of hands are required in assembling pieces to be sewed together, placing them under needle of machine, and guiding parts as they are being sewed.

M–3:20 Performs a variety of tasks in building maintenance for hotels, offices, schools, or apartment houses:

Manual dexterity is required in sweeping, mopping, washing, waxing, scrubbing and cleaning; and in using various handtools to perform minor maintenance functions.

M–3:21 Lays building materials to construct or repair walls, partitions, arches, sewers, and other structures:

Manual dexterity is required in manipulating equipment and tools; to place and stack material; erect scaffold; mix and spread mortar; cut bricks; and embed iron rods in mortar.

M–3:22 Assists in care of hospital patients, under direction of nursing and medical staff:

Manual dexterity is required in bathing and feeding patients; applying bandages; and massaging and giving alcohol rubs.

M–3:23 Tends unit of fresh work cigar machine that cuts binder leaves:

Manual dexterity is required to flatten leaf and lay it on suction plate die; to move leaf to new position as soon as machine cuts and removes first portion; and to brush scraps of leaves into box at side of machine. Constant hand and wrist movements required, involving placing leaf at various angles. Movements must be accurate to complement action of machine.

M–3:24 Operates machine to press face of composed type and plates into wood fiber mats to form stereotype casting mold for printing:

Manual dexterity is required to manipulate tools to trim, plane, level, saw, and shave plates for printing.

Level 4

M–4:1 Harvests fruit, working as crew member:

Manual dexterity is required to position sizing loop around lemons; to clip lemons from stem; and to deposit them in boxes.

M–4:2 Controls treatment plant equipment to purify and clarify water for human consumption and industrial use:

Manual dexterity is required to use specialized mechanical equipment and handtools, and to make adjustments and repairs to electric motors, pumps, and valves which control flow of water into plant.

M-4:3 Repairs and maintains physical structures of commercial and industrial establishments using hand and power tools:

Manual dexterity is required in repairing and maintaining woodwork and furniture; making electrical repairs; patching and repairing cement, and making minor plumbing and pipe repairs.

M-4:4 Removes stems from tobacco leaves to prepare tobacco for use as filler, binder, or wrapper for cigars, plugs, or twist chewing tobacco:

Manual dexterity is required in the hand operation of picking up handful of tobacco, selecting a single leaf, spreading it open; holding leaf with one hand, and pulling out stem with other hand.

M-4:5 Finishes household linens, such as sheets, pillowcases, tablecloths, and napkins:

Manual dexterity is required to shake, sort, fold, and stack laundry; to tie bundles of laundry together; and to feed and guide material into ironer.

M-4:6 Directs the operation of a battery of stills to distill crude oil:

Manual dexterity is required to turn knobs and switches on control panel; to position charts, tapes, and graphs in recording part of instruments; and to turn wheels and valves on the still and auxiliary equipment.

M-4:7 Tends circular knitting machine with automatic pattern controls that knit seamless hose:

Manual dexterity is required to pull hose over hands during operation, separate hose, stack yarns, thread yarn through proper channels when thread breaks; and to clean grease, lint, oil, etc., from machine.

M-4:8 Maintains library collection of books, periodicals, documents, films, recordings, and other materials, and assists groups and individuals to locate and obtain materials:

Manual dexterity is required in placing and removing books from shelf, inspecting books, and in handling books during check out.

M-4:9 Sorts rags and old clothing:

Manual dexterity is required to rip off buttons, pockets, hooks and eyes, snaps, and other foreign matter.

M-4:10 Teaches elementary school pupils academic, social, and manipulative skills:

Manual dexterity is required to prepare outlines, correct tests, record results, and to operate audio-visual teaching aids.

Level 5

No illustrations.

E — EYE-HAND-FOOT COORDINATION

Ability to move the hand and foot coordinately with each other in accordance with visual stimuli. (Not measured by GATB)

Level 1

E-1:1 Performs gymnastic feats of skill and balance while swinging on a trapeze, turning somersaults, or executing flying stunts alone or as a member of a team:

Coordinates hand and foot motions with visual stimuli, in order to reach for and grasp approaching bar or other aerialist while standing on or hanging from another swinging bar.

E-1:2 Pilots new, experimental, and modernized aircraft to determine their airworthiness:

Coordinates hand and foot controls in accordance with instrument readings and observed conditions while taxing aircraft to test controls, brakes, and shock absorbers; while maneuvering aircraft to test stalling, diving, gliding, rolling, and turning; and while on speed runs to test and evaluate stability, control characteristics, and aerodynamic design.

E–1:3 Performs ballet dances alone, with partner, or in group to entertain audience:

Coordinates feet and hands with vision in order to interpret dance role and to move in specified relationship with other members of cast; positioning arms and hands in coordination with other movements to achieve desired interpretive effect or expression, to maintain balance, or to lift, carry, or support other dancer.

E–1:4 Plays professional baseball:

Coordinates movements of hands and feet with what eye sees when catching, hitting, and throwing ball.

E–1:5 Instructs groups at playgrounds and schools in fundamentals and rules of competitive sports:

Coordination of hand and foot movements with visual stimuli is required to demonstrate, by example, techniques of play for various sports and movements and body positions which result in best execution of a particular "play" or maneuver.

E–1:6 Creates or interprets music on a drum, as member of orchestra, band, or other musical group, to entertain audiences:

Eye-hand-foot Coordination is required to hit or stroke drum heads with drum sticks or brushes and depress pedals to activate other drums and cymbals simultaneously, while following musical score and conductor's baton.

Level 2

E–2:1 Pilots airplane to transport passengers, mail, freight, or for other commercial purposes:

Coordinated movements of hand and foot controls in accordance with observed conditions of aircraft or external factors or conditions indicated by instrument readings is required to take over control of airplane in emergency or over ride programmed control in case of malfunction to taxi, take off, land, and control aircraft in flight.

E–2:2 Operates several types of powered construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers, or graders to excavate and grade earth, erect structural and reinforcing steel, and pour concrete:

Moves hand and foot controls in coordination with vision and each other to drive and steer machines and move materials into position.

E–2:3 Prunes and treats ornamental and shade trees and shrubs in yards and parks to improve their appearance, health, and value:

Eye-hand-foot coordination is required to climb trees or ladders and balance self while topping trees to control growth, sawing off dead, diseased, or undesirable limbs; scraping and filling cavities in trees with cement; and painting cut surfaces to seal them against insects and disease.

E–2:4 Raises, positions, and joins girders, columns, and other structural steel members to form completed structures or frameworks, working as a member of a crew:

Eye-hand-foot coordination is required to work above ground level balancing on ladders, scaffolding, or structural members while raising, positioning, fitting, and joining structural pieces.

E–2:5 Wires radio broadcasting and radio communications antenna systems, wood or steel antenna towers, and supporting cantinaries; repairs antennas; and paints antenna towers:

Eye-hand-foot coordination is required to climb wood or steel antenna towers, and to maintain balance while wiring or repairing system or painting tower.

Level 3

E–3:1 Attends to beef cattle on stock ranch:

Coordinates arm-hand and leg-foot motions with vision when riding horse to round up strays or to rope cattle; and to pin and tie down calves for branding.

E–3:2 Drives bus to transport passengers over specified routes to local or distant points according to time schedule:

Uses hands, arms, and feet simultaneously to move levers, pedals, and steering wheel to control movement of bus on highways and in city traffic.

E-3:3 Drives gasoline or diesel-powered tractor-trailer truck combination, usually over road (long distances on highways) to transport and deliver goods, livestock, or materials in liquid, loose, or packaged form:

Eye-hand-foot coordination is required to operate clutch, brake, and accelerator pedals, gear shift lever, and steering wheel to guide tractor-trailer on highways and streets, turn corners, negotiate narrow passageways, and backing up to warehouse terminal, or other loading docks.

E-3:4 Drives prototype or experimental vehicles, such as automobiles, trucks, or buses, under test conditions to obtain performance data:

Coordinates hand and foot movements with vision to operate gear shift lever, clutch, brake, and accelerator and to steer vehicles over test track, on city streets, or highways.

E-3:5 Maintains and repairs mercury-vapor, electric-arc, fluorescent, or incandescent street lights or traffic signals:

Coordinates hand and foot movements with vision to climb ladder to reach lamp, or stand in tower-truck bucket moving levers to position bucket near lamp; to maintain balance while using hands and vision to test circuits, locate broken wires, and replace fuses, bulbs, and transformers.

E-3:6 Renders a variety of personal services conducive to safety and comfort of airline passengers during flight:

Coordinates hand and foot movements with vision to serve food and beverages without spilling them; to walk in aisle, when airplane encounters rough weather, carrying trays or other items.

E-3:7 Serves passengers in railroad dining car:

Eye-hand-foot coordination is required to carry loaded trays and serve food at tables in a moving dining car.

E-3:8 Loads and unloads ships cargoes:

Coordinates hand and foot motions with vision when guiding slings used to lift cargo to avoid tripping and to keep load from swinging and bumping into other objects; when standing on ladders, platforms, or other objects to stack and arrange cargo high in the hold and to store cargo in ship's hold to prevent shifting during voyage.

Level 4

E-4:1 Tends machine that crimps eyelets, grommets, snaps, buttons, or similar fasteners to material such as cloth, canvas, paper, plastic, leather, or rubber to reinforce holes, attach fasteners, or to attach parts:

Coordinates hand and foot motions with vision when positioning material, fasteners and ram of machine, while depressing foot pedal to activate ram which crimps fastener to material.

E-4:2 Parachutes from airplane into inaccessible forest to suppress forest fires:

Coordinates hand and leg movements with vision to pull shroud lines and collapse chute while landing in manner to reduce impact and to prevent being dragged by chute.

E-4:3 Transcribes letters, reports, or other recorded data, using a transcribing (voice reproducing) machine and typewriter:

Coordinates hand and finger movements to operate typewriter and foot movements to start and stop transcriber with typed copy to control length of lines and positioning and spacing of copy.

E-4:4 Operates pressing machine to smooth surfaces, flatten seams, or shape articles, such as garments, drapes, slipcovers, and hose, in manufacturing or dry cleaning establishment:

Simultaneous eye-hand-foot coordination is required to step on foot pedal, pull down on pressing head while observing garment to see that it does not slip out of position on press buck; holds pedal down with foot to keep press head against garment; press lever with fingers to emit steam from press head; keep pressure on press head handle to raise counterbalanced head gently, while stepping on second pedal to exhaust steam to cool and dry garment.

E–4:5 Diagnoses and treats diseases, injuries, and malformations of teeth, gums, and related oral structures:

Coordinates hands and foot with vision to place drill on tooth, depress foot pedal to start drill action; and release pedal to stop drilling.

E–4:6 Instructs novices and players who wish to improve their skill in playing golf:

Coordinates movements of hands and arms with legs, feet and vision to demonstrate the proper grip, stance, and swing to use with the various clubs and ball positions on the field of play.

E–4:7 Quotes prices, receives payment for, and wraps articles selected by customer in a retail establishment:

Eye-hand-foot coordination is required on occasions when ladder is used to reach articles on highest shelves by grasping ladder rung with one hand, stepping on lower rung, reaching for article with other hand while ladder slides along an overhead rail.

Level 5

No illustrations.

C — COLOR DISCRIMINATION

The ability to match or discriminate between colors in terms of hue, saturation, and brilliance. To identify a particular color or color combination from memory and be able to perceive harmonious or contrasting color combinations (not measured by GATB).

Saturation: Refers to the purity of color. Some colors have greater purity or amount of a certain color than others; that is, they have a more pronounced hue. For example, deep red is more "reddish" than light red.

Hue: Refers to the color itself and is dependent upon the dominant wavelength in any spectral energy distribution. It is that quality that differentiates the "blues," "greens," "reds," etc.

Brilliance: Refers to the brightness of a color. It is the amount of light reflected from a surface and can range from high to low, as when comparing a white snowflake with a mark made by a lead pencil.

Color Matching: Varying the components of a color mixture until it does not differ visually from a given sample.

Color Memory: The ability to retain an accurate visual image of a color and to be able to use it as a basis for matching and discriminating.

Level 1

C–1:1 Develops color formulas for printing textile and plastic materials and plans and directs activities of color shop:

Color discrimination is required to select and combine appropriate dyestuffs and pigments to achieve desired colors; to distinguish minute differences in shades; and to visualize the hue and brilliance which will result from mixing the primary colors in various proportions.

C–1:2 Paints portrait of person, usually in oil, on canvas, using living subject:

Color discrimination is required to combine paints and oils to develop colors which accurately reproduce coloring of subject; and to apply these colors on canvas in combinations of light and shade which give lifelike effect.

C–1:3 Studies production requirements, such as character, period, setting, and situation, and applies makeup to performers to alter their appearances in accord with their roles:

Examines sketches, photographs, and plaster molds to form color image of characters to be depicted, selecting prostheses, cosmetics, and makeup materials, such as wigs, beards, rouge, powder, and grease paint, and applying these to change such physical characteristics of performers as facial features, skin texture, and coloring to produce effect appropriate to depict character and situation.

C-1:4 Performs surgery to correct deformities, repair injuries, prevent diseases, and to improve functions in patients:

Uses color discrimination and color memory in making diagnosis of patients' affliction or condition, by recognizing any deviations in color of diseased tissue from healthy tissue; evaluating color characteristics such as hue and saturation of affected body parts; and making determination as to extent or origin of condition.

C-1:5 Reweaves damaged areas of oriental or other expensive rugs, following color, pattern, and weave of rug:

Color discrimination is required to perceive color scheme of rug so that proper alterations can be made which are consonant with rug's total color configuration, and to select yarn which is equivalent in color to that in rug.

C-1:6 Selects bits of glass for color, thickness, and texture which will give desired shade for stained windows:

Color discrimination is required to detect differences in shades of colors and be able to judge properties of hue and texture which will produce effect desired.

Level 2

C-2:1 Mixes stains, paints, and other coatings for use in painting according to formulas:

Color discrimination is required to detect any differences in color between mixture and sample and to rectify the color differences by adding pigment until exact shade is produced.

C-2:2 Investigates properties and treatment of metals to de[illegible]ew alloys, new uses for metals and a[illegible]ys, and methods of producing them commercially:

Spectroscopic study of metals and alloys requires ability to discriminate between various colors and shades of same color as they are refracted onto screen, and to judge dispersion of alloy particles and their relative purity by means of color emission.

C-2:3 Provides beauty services for customers:

Is able to select shade of dye or tint to use in retinting or dyeing hair to match that already on hair, or to choose a shade or tint that will accentuate natural hair color.

C-2:4 Plans and designs artistic interiors for homes, hotels, ships, commercial and institutional structures, and other establishments:

Is well informed on outcome of blending various colors in interior decorating and capable of choosing color schemes which are harmonious with each other and particular setting.

C-2:5 Draws and paints illustrations for advertisements, books, magazines, posters, billboards, and catalogs:

Studies design layout or proposed sketch and selects colors best suited to produce desired visual effect; executing design; using selected color and rendering details such as skin tone, shade, and texture from color memory.

C-2:6 Changes undesirable details of illustration copy which is to be reproduced by lithographic process:

Compares negative or positive with original copy to determine color correction, silhouetting, or opaquing requirements; prepares dye or other chemicals; intensifies or reduces unsatisfactory tone values in film or glass by adding color to lithographic plates to achieve required hue.

C-2:7 Colors portraits with photographic oil colors as specified to give them natural, colorful, lifelike appearance:

Mixes photographic colors to correspond with natural lifelike appearance, by dipping applicator into colors and applying it on face of portrait freehand, being careful to apply appropriate amount; removing excess color from portrait until desired shade is obtained; and mixing various colors and shades of colors to delineate certain facial features such as eyes, lips, and cheeks.

C-2:8 Designs caps, hats, or millinery, copies or modifies existing designs, draws and cuts out master patterns, and makes sample article:

Has ability to obtain harmonious and/or contrasting color combinations in selecting shades and colors for fabrics and trimmings.

C-2:9 Studies effects of drugs, gases, dusts, and other materials on tissues and physiological processes of animals and human beings:

Color shades and hues are used as basis for drawing valid conclusions about effect of drug or stain; and color matching is required when preparing two solutions of equal concentration or proportion.

C-2:10 Prepares, stuffs, and mounts skins of birds or animals in lifelike form:

Color memory is required in painting eyes, teeth, claws, and feathers to enhance lifelike appearances of specimen, and in dressing-out, embalming, or otherwise preparing animal carcasses.

C-2:11 Molds pulverized marble, metallic oxides or pigment, cement, and water in specific pattern to form terazzo tile:

Color discrimination is essential in apprehending color values of pattern to be depicted; and color matching is required in mixing pigment, cement and water, so that finished tile is equivalent in terms of color to that of a standard.

Level 3

C-3:1 Examines and grades pieces of leather to make articles, such as garments, gloves, and mittens according to specifications:

Color discrimination is required to match color of leather in each grade so that it is equal in terms of hue, saturation, and brilliance.

C-3:2 Examines pearl buttons and sorts them according to grade:

Color discrimination is required to observe buttons on conveyor belt or worktable; at production line pace; to sort them into containers according to shade and purity of color, and degree of irridescence.

C-3:3 Examines, sorts, and grades sample fruit from load at receiving point:

Judges by color of peeling or exterior coating of fruit its state of maturity (overripe, ripe, or not ripe).

C-3:4 Sets up and operates motion picture projection and sound reproducing equipment to produce coordinated effects on screen:

Regulates projection light and adjusts color filters to render lifelike appearance of motion picture or slide on screen.

C-3:5 Tests temperature of glass melting furnaces and regulates gas and air supply to maintain specified temperature:

Observes color of flame through opening of optical pyrometer and turns dial on pyrometer until color of wire filament matches luminosity of flame. This color matching technique requires the worker to be able to make discrimination in color between the flame and wire filament.

C-3:6 Tests milk to determine bacterial count, percentage of butterfat, and amount of acid in milk of each cow in herd:

Measures out specified amount of methylene blue and observes time required for blue color to disappear in determining bacterial count; and discriminates between various shades of red and blue when using ph indicator.

C-3:7 Repairs and rebuilds upholstered furniture, using handtools and knowledge of fabrics and upholstery methods:

Color discrimination is essential in distinguishing areas which require repairing and in selecting fabric which is equivalent in color characteristics to that already on furniture.

C-3:8 Displays and sells cotton, linen, rayon, silk, and wool yard goods:

Color discrimination is necessary to distinguish between different shades and colors of fabrics in filling customers' orders; and to match fabrics for color.

Level 4

C-4:1 Performs various tasks in a fish hatchery:

Uses color discrimination and matching to sort fish according to size, coloring, and species in transferring them to proper tanks.

C-4:2 Arranges tiles into designs for such use as floor or sink tops and pastes paper on tile to preserve arrangement of design:

Is able to discriminate between colors in order to insert individually colored tiles in slots following sample design.

C-4:3 Inspects furniture and parts for defects:

Color matching is required in verifying color of furniture against work ticket specifications; and in detecting differences in shade of same color so that defective workmanship can be discovered.

C-4:4 Cuts and trims meat to size for display or as ordered by customer using handtools and power equipment:

Is able to distinguish different shades and colors in selecting meats according to customer's specifications and in inspecting meats for quality.

C-4:5 Inspects sample lots of varnish for acids, color, clearness, cracks, crystallization, sediment, and drying qualities, to ascertain whether varnish conforms with specifications before packing process:

Uses color discrimination and matching to compare sample varnish with standard varnish for any discrepancies in color.

Level 5

No illustrations.

Procedures for Rating and Recording Aptitudes Requirements

A job must be rated for all aptitudes. The analyst is to indicate the level of each aptitude required of the worker for average satisfactory performance. The analyst arrives at this determination by careful study of the activities involved in the job and the specific abilities which the worker uses that can be identified in terms of the aptitudes. Certain of these aptitudes can be identified through study of the physical actions which the worker performs. Examples are: Motor Coordination, Finger Dexterity, and Eye-Hand-Foot Coordination. Other aptitudes such as Spatial, Numerical, and Intelligence are identified by considering the decisions the worker must make and the other mental processes involved in order to perform the tasks in the job.

In making his determination, the analyst will always consider the job as an organized method of carrying out a vocational purpose, and the illustrative situations as aids in making his judgment of the levels of aptitudes required. It is unwise to rely on reference to job title alone. Experience has shown that this results in rating according to impressions and "cliches" rather than to actual occupational criterion.

In Item 6, on the job analysis schedule, beside each aptitude factor designation, place the numeral 1 through 4, to indicate the level required for satisfactory performance. Use the numeral 5 if the aptitude is not required. Level 5 should not be assigned to Intelligence (G) as it is assumed that every job requires at least a "4" level of this aptitude.

Definition and Background

For the purpose of collecting occupational data, TEMPERAMENTS is defined as the adaptability requirements made on the worker by specific types of job-worker situations.

Temperaments, as one of the components of job analysis, grew out of the belief that different jobs call for different personal traits on the part of the worker. Experience in placing individuals in jobs indicates that the "temperament" of an applicant is often a determining factor in his success in the job. For instance, a person's dissatisfaction or failure to perform adequately may be attributed to inability to adjust to the work situation rather than to inability to carry out job duties.

Employer hiring requirements commonly include "personal characteristics" which relate to temperaments, as well as work experience, education, and training. Often an employer will specify certain "personality" traits which he does or does not wish a worker to possess.

It is possible to evaluate these traits in individuals by interviews, tests, or work histories; while for jobs they can be evaluated in terms of requirements made on the worker by specific job-worker situations.

Temperaments Factors, Definitions, and Illustrative Situations

Each factor is dealt with in a separate section and contains the following elements:

1. The single letter symbol for the factor which is used for recording temperaments traits in Section 6 of the job analysis schedule.
2. The acronym for the factor which is used when referring to the factor in a narrative situation.
3. The definition of the factor.
4. A statement to serve as a guide when considering use of the factor.
5. A list of general work situations illustrating the factor. The list indicates some of the work areas in which the factor is important.
6. A list of illustrative specific job-worker situations in which the factor is important. These represent the various levels of complexity and kinds of work in which the factor may be significant. In some of these situations the reason for the importance of the factor is explained in a parenthetical statement.
7. A list of specific job-worker situations in which the factor is not important. This list indicates situations that might be construed as requiring the specific factor, but do not for reasons shown in the parenthetical statement.

D — DCP

Adaptability to accepting responsibility for the direction, control, or planning of an activity.

Consider jobs for this factor when the worker is in a position to negotiate, organize, direct, supervise, formulate practices, or make final decisions. Do not consider when the planning is for one's own activities.

General Work Situations Illustrating Trait

Is responsible for an entire project or program.

Plans for future to keep abreast of changes in industry.

Situations in Which DCP Is Important

Teaches elementary school pupils academic, social, and manipulative skills in urban or rural communities. (Works under the general supervision of principal, but has the responsibility for the direction and planning of class activities.)

Plans and designs private residences, office buildings, factories, and other structures; and organizes services necessary for construction. (Responsible for entire activity through planning and designing of structures and direction of construction activities through subordinate supervisors or independent building contractors.)

Applies principles of accounting to install and maintain operation of general accounting system. Supervises subordinates in such bookkeeping activities as recording disbursements and expenses. (Responsible for entire activity, including direction of activities of others through the installation and maintenance of the accounting system and the supervision of the accounting office clerical staff.)

Supervises and coordinates activities of workers engaged in maintenance of stables and care of draft animals or race horses. (Responsible for entire activity, including direction of activities of others.)

Conducts prosecution in court proceedings in behalf of city, country, State, or Federal Government. Gathers and analyzes evidence, reviews pertinent decisions, and other legal matters pertaining to case. Presents evidence against accused to grand jury. Appears against accused in court of law and presents evidence before judiciaries and jury. (Responsible for all phases of the prosecution and for the direction and control of deputies when they are employed.)

Is responsible for musical aspect of programs or motion pictures through selection of music and performers, conducting of orchestra, and review of work performed by staff.

Commands fishing vessel crew engaged in catching fish and other marine life. Directs fishing operations, using knowledge of fishing grounds and workload capacity of vessel and crewmen. (Responsible for the vessel and its crew, as well as the fishing operations.)

Coordinates activities in international cargo traffic division of railway express agency. (Responsible for air and surface cargo traffic movements and for the direction and control of activities of his subordinates.)

Plans and directs rehabilitation program for newly blinded patients.

Plans artistic effects for outside displays, such as street decorations, using flags, cloth, and crepe paper, and directs workers in erecting these displays. (Responsible for the entire display design and erecting activity.)

Situations in Which DCP Is Not Important

Instructs and advises poultry growers in developing programs for disease prevention and control, for building and equipment maintenance, and to improve poultry raising. (Advises, teaches, and suggests, rather than directing, controlling, or planning.)

Coordinates activities of engineering survey party engaged in determining exact location and measurements of points, elevations, lines, areas, and contours of earth's surface to secure data used for construction, mapmaking, land valuation, mining, and other purposes. (Plans own activities but not those of other workers.)

Makes ready and operates a cylinder-type printing press. Directs worker who feeds press in adjustment of feed guides, grippers, and elevator; or directs him to feed sheets to press if hand fed. (Work is performed according to set procedure and planning is not required.)

Aids residents of private and public housing projects and apartments in relocation and provides information concerning regulations, facilities, and services. (Coordinates information, does not plan.)

F — FIF

Adaptability to situations involving the interpretation of feelings, ideas, or facts in terms of personal viewpoint.

Consider jobs for this factor when the worker is called upon to use creativity, self-expression, or imagination. Interpretation is defined as an individual's concept of a work of art, subject, plan, etc. as shown in performance, criticism, artistic representation, or the like.

General Work Situations Illustrating Trait

Reflect original ideas or feelings in work.

Views and treats subject imaginatively rather than literally.

Interprets character or impersonates a person, animal, or thing.

Perceives and appreciates a mental image, or the translation of a mental image created by another.

Situations in Which FIF Is Important

Designs and creates art work, decorations, and useful objects (statues, monuments, and ornaments) from various media, such as stone, concrete, or wood, using chisels, hammers, and knives; in clay, wax, or plastics, using fingers and small tools; or in metals, using welding and grinding equipment or casting techniques.

Designs artistic effects for outside displays, such as street decorations, fair grounds displays, and building decorations using flags, cloth, and crepe paper. Designs decorations around central themes, such as holidays, seasons, political rallies, or local celebrations or shows, choosing appropriate colors, shapes, and sizes or media to focus public attention and create desired effect.

Photographs persons, motion picture sets, merchandise, building exteriors and interiors, machinery, and fashions to be used in advertising and selling. Sets up objects and materials, such as lights, screens, shades and cameras; and arranges subjects to compose backgrounds, and create desired effects.

Originates choreography, according to central theme, setting mood, and music of performance, for ballets, musical shows, or revues.

Creates advertising themes; designs layouts; and selects colors, coloring media, props, and lighting arrangements for advertising displays.

Acts out the part of specific characters in productions, such as stage plays, moving pictures, and television shows.

Invents melodic, harmonic, and rhythmic structures; translates them into musical notes; and records notes on scored music paper to express ideas musically within circumscribed form, such as symphony, sonata, or opera.

Directs instrumental music groups in rendition of selections to interpret musical score and create effects for listeners.

Entertains listeners by singing songs in popular idiom on stage, radio, television, or in nightclubs.

Writes descriptive or critical literary interpretation, choosing subject matter from fields such as politics, social conditions, theology, or drama, requiring qualifications by knowledge, experience, or research.

Changes physical appearance and facial features of performers to portray a specific character.

Analyzes business problems, such as development of integrated production, inventory control, and cost analysis system, to refine their formulations and convert them to forms applicable to electronic data-processing system.

Creates crossword puzzles by designing forms of numbered, blank, and opaqued squares; fiting words in vertical and horizontal order so that spelling coincides where they cross; and composing short definitions for puzzle words.

Composes and writes humorous articles for publication, choosing own subject matter; or writes humor on particular subject for specific occasion.

Assumes protective undercover identity, utilizing mannerisms, speech, clothing and living habits peculiar to the desired role, to obtain information and evidence that will assist in solving criminal cases.

Situations in Which FIF Is Not Important

Interprets company policies and machine accounting processes for subordinates. Develops machine accounting procedures, or interprets accounting system for development of mechanized processes by others. (Interpretation and development of procedures, in this instance, do not reflect or express the individual's personal ideas and feelings.)

Colors by hand or sprays designs on cards, calendars, maps, and related articles following instructions of working drawings. (Expresses the ideas and feelings of the worker who developed the instructions or working drawings.)

Instructs students in one or more subjects, such as English composition or mathematics, in private, religious, or public high school. (Teaches from textbooks written or edited by others; does not interpret.)

Carves designs and figures in full and bas-relief on stone, employing knowledge of stonecarving techniques and sense of artistry to produce carving consistent with designer's plans. (Although work requires sense of artistry, the worker is not interpreting feelings in terms of a personal viewpoint, but in those of the designer.)

I — INFLU

Adaptability to influencing people in their opinions, attitudes, or judgments about ideas or things.

Consider jobs for this factor when the worker is in a position to motivate, convince, or negotiate.

General Work Situations Illustrating Trait

Writes expository material.

Convinces customers on the merits of merchandise.

Designs advertising layouts.

Projects sincerity and knowledge during various types of negotiations to obtain acceptance of ideas or plans.

Situations in Which INFLU Is Important

Writes original descriptive advertising copy, extolling the merits of a certain product, that will influence the buying public in favor of the product.

Calls on newcomers to the neighborhood, new parents, and brides; presents token gifts or gift certificates; and explains services available from merchants, to promote goodwill and solicit business.

Conducts safety meetings to acquaint plant personnel with potential hazards and the need for complying with safety regulations and utilizing all available protective devices.

Writes news or human interest stories dealing with company activities and personnel or company-sponsored events for newspaper release.

Plans special exhibits, lectures, contests, or luncheons and writes advertising script for radio and television to promote favorable publicity and create goodwill for financial institution or business establishment.

Writes editorials and articles on topics of current interest, expressing viewpoints and policies of newspaper or magazine to stimulate or mold public opinion.

Confers with legislators and other public officials to bring about passage, defeat, amendment, or introduction of legislative bills in support of client's interests. Encourages individuals and groups having similar interests to present views to legislators. Prepares articles, news releases, and similar materials for dissemination to press and public, stating client's views on legislative matters. Conducts press conferences, delivers public speeches, and participates in radio and television discussions to convince public of desirable or adverse features of proposed legislation.

Calls on licensed practitioners, hospitals, and drug establishments to introduce, promote use of, and sell ethical drugs, proprietary medicines, and other pharmaceutical products. Describes characteristics; explains clinical studies; and discusses dosage, use, and effects of new drugs and preparations, to inform customers about them and point out advantages of each.

Demonstrates textiles, food preparations, and operation of household equipment to attract consumers for merchandise. Lectures on product uses; conducts cooking classes; and directs fashion shows to develop markets for new household products, food preparations, and style-trend garments. Arranges food displays for advertisements and television commercials to promote sales of specific products.

Guides visitors through bakery and explains production methods to acquaint public with efficiency of processes and immaculate appearance of plant and workers. Displays products, distributes samples, and gives illustrated lectures to acquaint visitors with products' appearance, palatability, and wholesome qualities.

Plans and directs educational campaigns to promote public support of such community programs as housing, transportation, and hospital facilities. Contacts business representatives and addresses trade conventions to induce labor and industry to immigrate into area.

Cajoles passing public with bombastic descriptions of show attractions by emphasizing variety, novelty, beauty, or other features believed to entice persons to attend entertainment.

Coaxes nightclub and restaurant patrons to pose for pictures; discusses finished prints or proofs with customers and solicits orders for prints.

Confers with management officials on matters affecting union members, such as hours, wages, grievances, to argue cases and win best possible position for workers.

Discusses sites with owners and makes offer of terms and price to induce them to lease property for erection of billboard signs.

Contacts individuals and firms by telephone, in person, or by other means to persuade them to contribute money and/or time to charitable organizations.

Situations in Which INFLU Is Not Important

Receives payment for merchandise, such as bakery goods, magazines, groceries, books, and tobacco selected by customer. Wraps or bags merchandise. Keeps shelves stocked with merchandise. (Worker is not expected to influence customer's selection of articles.)

Engages in activities related to conditional release of juvenile or adult offenders from correctional institutions. Establishes relationship with offenders and familiarizes himself with offender's social history prior to and during institutionalization. Participates in formulation and development of release plan. Provides treatment supervisions of offenders upon release by conducting a plan of regular treatment and interviews. Helps parolee to secure necessary education or employment and refers him to social resources of the community that may aid in rehabilitation. Where possible, involves families of parolees in helping to solve problems of adjustment. (Worker presents information and choices to parolee.)

Counsels students relative to educational and personal activities. (Worker presents information and choices to students.)

Organizes and leads groups in activities that meet interests of individual members. Develops recreational, physical education, and cultural programs for various age groups. Demonstrates and instructs participants in activities such as active sports, group dances, arts, crafts, and dramatics. (Worker leads activities and instructs individuals, but does not attempt to influence them.)

J — SJC

Adaptability to making generalizations, evaluations or decisions based on sensory or judgmental criteria.

Consider jobs for this factor when the worker relies on one or more of five physical senses, or relies on knowledge gained by experience to make evaluations. Be aware of situations in which the worker appears to be evaluating on the basis of senses or experience, but is actually using memorized data.

General Work Situations Illustrating Trait

Judges receptiveness of audience or emotional quality of scene.

Interprets attitude of customer.

Selects materials and objects to produce desired effect.

Determines most feasible plan for presenting client's case.

Judges quality of item, using one of five senses.

Situations in Which SJC Is Important

Evaluates data relating to community organizations, social customs, the family, and other phenomena, to determine method of collection, organization, and adaptation that will facilitate their use by those engaged in the solutions of social problems.

Observes and feels bread, cake, cookie, and pastry doughs to determine desired consistencies at various stages of preparation and adequacy of baking during cooking period.

Considers applicability of laws, regulations, and previous court decisions to client's problems and determines most feasible and favorable plan for conducting client's case.

Determines appropriate colors and color combinations, according to room size, its exposure, and intended use, and available colors, patterns, and textures; and advises clients in selection of draperies, floor coverings, paint, and wallpaper.

Appraises scenery designs, sound and lighting effects, costumes, and choreography to determine their congruency with chronology, setting, basic theme, and mood of play.

Determines appropriate pose, lighting effect, and background for subject based on intended use of picture and features to be emphasized.

Judges effectiveness of different physical arrangements of illustrations, and print sizes and types in relation to designated advertising media to plan appropriate advertising layout.

Analyzes interpretations of subject matter in fields such as politics, social conditions, theology, or drama, for which qualified by knowledge, experience, or research to express opinions and inform public.

Feels hops by squeezing them in hand to ascertain moisture content and effectiveness of drying process.

Writes music arrangements, employing knowledge of music theory, harmony, form, notation, and dynamics, and wide experience and background in music to improve tempo and harmonic effects, dynamics, and shading of musical selection.

Considers physical, psychological, and social factors that contribute to client's personal, family adjustment, financial, employment, or physical and mental impairment problems, to counsel client and aid in his recovery or reformation.

Evaluates ability, behavior, and performance of animals, such as lions, tigers, bears, and elephants to train them to perform, and to originate acts based on performance of individual animals.

Judges speed, performance, and relative position of other racing cars to determine when, where, and how to drive so as to be in favorable position to win automobile race.

Evaluates performance of aircraft in such maneuvers as stalls, dives, glides, rolls, turns, and speed runs to determine its stability, control characteristics, and the suitability of aerodynamic design.

Pulls cotton tuft apart between fingers, observing effort expended in breaking sample, fineness of fibers, and drag as fibers cling to each other, to determine character (strength, uniformity, and cohesive quality) of fibers and judge grade.

Evaluates growing conditions and market demands to select type and amount of grain to be purchased for seed. Considers ripeness and maturity of grain and weather conditions to determine when grain will be harvested.

Situations in Which SJC Is Not Important

Ascertains such characteristics of photographic emulsions as their speed, contrast, and maximum density. (Bases his determinations on instrument readings which is not judgmental criteria.)

Develops formulas for paper-coloring dye and prepares directions for mixing dye with pulp to produce colored paper to specifications or customer's sample. Determines composition of color sample, using spectrophotometer. Mixes pulp with water, size, filler, and other ingredients to make sample of type and quality of paper specified. Compares color of handsheet with color sample, visually or with spectrophotometer. (Evaluation is made on the basis of verifiable criteria.)

Compiles control records on work in process in advertising agency to insure completion of art work, copy, and layouts prior to deadline. Keeps schedules on work to insure arrival of printing and art work as needed, and to insure completion of copy. (Not required to make decisions.)

Sorts scrap metal and removes foreign matter preparatory to use in recasting. Shovels metal scrap onto conveyor belt leading to magnetic drum that removes iron and steel pieces. Removes contaminating nonferrous metals by hand. (The little judgment used is based on verifiable criteria.)

M — MVC

Adaptability to making generalizations, judgments, or decisions based on measurable or verifiable criteria.

Consider jobs for this factor when the worker makes evaluations on the basis of data. Be aware of situations in which the worker appears to be evaluating on the basis of senses or experience, but is actually using memorized data.

General Work Situations Illustrating Trait

Settles claims on the basis of presented facts.

Determines presence of disease from laboratory tests.

Develops new products from knowledge of properties of matter and energy.

Constructs articles utilizing knowledge of characteristics of basic materials.

Writes article, essay, pamphlet, or book on basis of facts.

Situations in Which MVC Is Important

Determines physical properties of metals by measuring qualities, such as strength, hardness, elasticity, toughness, maleability and ductility, using pressure devices, hot acid baths, and other apparatus.

Examines works of art, using X-ray, chemical tests, and other scientific aids, to determine their authenticity.

Cultures and tests pathogenic bacteria, using laboratory techniques, such as staining and microscopic examination, and serological, immunological, and animal innoculation procedures, to identify bacterial strains and types and determine their virulence.

Examines and measures industrial diamonds to determine their quality, shape, and size, using classification standards and gages.

Studies body tissues, fluids, secretions, and other specimens, using laboratory tests and procedures, to determine presence and stage of diseases.

Measures and records events that occur as rapidly as one billionth of a second apart, using electronic instruments, to observe decay of radioactive atomic nuclei.

Selects lens blanks from stock, according to prescription specifications, cuts and grinds lens edges to fit specified frames, and assembles components to make spectacles for customer.

Examines patient and utilizes physical findings and laboratory results, to determine nature and extent of prenatal and postnatal treatment and care required.

Positions work-piece fixtures, and adjusts flame controls and timing cycles of flame-hardening machines, according to heat-treating methods, specific metal properties, and metallurgical work order specifications, to prepare machines for other workers to operate.

Determines position and plots courses, using standard navigation aids, such as compass, sextant, clock, radio fix, and navigation tables, to locate specific areas on fishing grounds and set return courses for port.

Tests samples from potato shipments for solidity, content, temperature, and percent of rot, using hydrometer, thermometer, and visual count of defective potatoes, to determine acceptance or rejection of shipment, according to company standards.

Plans and schedules programs and routines, according to nature of data to be processed, storage capacity, speed of computer, extent of peripheral equipment, and intended use of output information, to process business data by electronic data-processing equipment.

Analyzes records of present and past operations, costs, realized revenues, administrative commitments, and obligations, to establish basis for preparing operating budget.

Determines initial claim eligibility, paying jurisdiction, and type of claim to be filed for unemployment benefits from claimant's and employer's statements and department records.

Inspects aircraft prior to takeoff for defects, such as fuel or oil leaks, and malfunctions in electrical, hydraulic, or pressurization systems, according to preflight checklist, to insure safe and efficient operation of aircraft.

Examines gun components and measures dimensions and clearances, using gages and micrometers, to determine causes of gun malfunctions.

Observes temperature gage or recording charts and adjusts gas valves, dampers, and fan speeds to maintain specified temperature in malt drying kiln.

Measures fuel level in aircraft tanks with measuring stick; reads fuel gages; and verifies specific gravity of fuel from charts to determine fuel weight and distribution for aircraft weight and balance specifications.

Applies mathematical formulas to ascertain comparative rates with other utilities; calculates rates and salesmen's weekly commissions; and determines percentage of increase or decrease in monthly gas consumption.

Situations in Which MVC Is Not Important

Instructs individuals and groups in theory and application of proper automobile driving skills. Illustrates and explains handling of automobile in emergencies, driving techniques, and mechanical operation of automobile. Observes individuals in actual driving of automobile, explaining and demonstrating operation of brakes, clutch, gearshift, and automatic transmission. (Decisions and evaluations made by worker are relatively insignificant.)

Rides racehorses at racetrack. Receives riding instructions from horse trainer before race. Rides horses from starting gate to finish line, analyzing ability and peculiarities of his and other horses to determine how he should ride. (Decisions made are based on subjective criteria.)

Guards industrial or commercial property against fire, theft, vandalism, and illegal entry. Periodically tours buildings and grounds of plant or establishment, docks, or work site. (Any evaluations made by worker are generally on a clear-cut basis.)

Plans and conducts public relations programs designed to procure publicity for groups, organizations, etc. Selects and assembles publicity material that is in accordance with organizational policy. Writes news releases and submits photographs to newspapers. (Decisions and evaluations are made on a subjective basis.)

Rents automobiles to customers at hotels and transportation stations. Examines customer's driver's license, and determines amount of deposit required. Quotes cost of rental, and completes rental contract. (Decisions made by worker are minimal.)

P — DEPL

Adaptability to dealing with people beyond giving and receiving instructions.

Consider jobs for this factor when the worker must relate to people in situations involving more than giving or receiving instructions.

General Work Situations Illustrating Trait

Cooperates with other workers.

Has agreeable working relations with others.

Contacts others in successful manner.

Works as a member of a committee.

Situations in Which DEPL Is Important

Supervises and coordinates activities of work crews engaged in distributing sample merchandise, handbills, or coupons. Confers with superiors to plan activities and resolve operational problems relating to distribution of materials.

Schedules appointments with employer or other employees for clients or customers by mail, phone, or in person; and records time and date of appointments in appointment book.

Promotes sales and creates goodwill for firm's products by making speeches at retail dealers conventions and calling on individual merchants to advise ways and means of increasing sales.

Counsels clients on problems and gives advice to aid individuals and families having problems concerning family relationships or other aspects of their social functioning that affect unity of family and welfare of community.

Interviews newsworthy persons, or persons involved in news events, to persuade them to pose for pictures and provide information to use as picture captions.

Issues transfer slips, makes change, and answers questions for patrons of transit bus.

Talks with people to give and obtain information relating to the relay of incoming, outgoing, and interoffice telephone calls.

Interviews unemployed workers to obtain data for determining their eligibility for unemployment benefits.

Guides sportsmen to hunting and fishing areas, explains hunting and fishing laws, and recommends suitable firearms or fishing tackle to take specific game or fish species.

Renders variety of personal services conducive to safety and comfort of airline passengers during flight. Greets passengers; explains use of safety equipment; and answers questions to establish rapport, gain passengers' confidence, and dispel any anxieties about air travel. Observes passengers during flight to detect signs of discomfort; and issues palliatives to relieve minor symptoms.

Gives information and renders assistance to motorists having difficulties, to aid them on their way and reduce accident hazards. Arrests law violators, discusses infractions with them, and issues citations or takes them into custody.

Speaks to groups and contacts individuals to solicit new memberships for an organization.

Manages affairs of entertainers and negotiates with agents and producers to arrange engagements for clients. Confers with union, motion picture or television studio, theatrical production, or entertainment house officials to

183

bargain for contracts, terms, and financial return for engagements.

Consults with medical, nursing, and social service staffs concerning problems affecting patient's food habits and needs in order to formulate therapeutic diet menus compatible with each condition and treatment sequence.

Solicits clients and sells all types of life insurance, based on prospect's present insurance and government benefits, to establish plans for financial security. Confers with client to advise concerning life insurance, pensions, taxation, and family finance. Calls on policyholders to keep insurance program up-to-date, to make changes in beneficiaries, and to suggest changes or additions in insurance program.

Applies makeup to performers to alter their appearance in accord with their roles.

Situations in Which DEPL Is Not Important

Drives private car as ordered by owner or other passenger and performs miscellaneous duties. (Relationship to people is primarily limited to following the immediate instructions of the employer.)

Computes wages and posts wage data to payroll records. (Receives instructions from supervisor and exchanges information with coworker but is not required to deal with people in any other capacity.)

Operates four-roll calender to coat fabric with rubber or produce plastic sheeting and roll sheets to specified thickness. Adjusts automatic control and observes dial to heat rolls to specified temperature. Starts machine and adjusts conveyor speed to regulate feeding of stock. (Worker only carries out duties around others, but could just as well perform apart from them.)

Directs traffic by motioning with flag when construction work obstructs normal traffic route. (Worker does not have an interpersonal relationship with the public.)

Photographs persons, motion picture sets, merchandise, exteriors and interiors, machinery, and fashions to be used in advertising. (Worker's relationship to models is limited to giving instructions.)

R — REPCON

Adaptability to performing repetitive work, or to continuously performing the same work, according to set procedures, sequence, or pace. Distinguish between work that is inherently of a repetitive nature and the human facility of making the familiar routine. This factor should be considered when the work is performed according to a routine, or set sequence, and there is an absence of diversion or room for independent judgment.

General Work Situations Illustrating Trait

Continuously performs the same operation on same machine.

Keeps up with other workers in assembly line.

Feeds machine at correct and specified intervals.

Situations in Which REPCON Is Important

Addresses cards, envelopes, advertising literature, packages, and similar items for mailing, by hand or using typewriter. (The variety of materials addressed does not change the repetitive nature of the work.)

Sorts agricultural produce, such as bulbs, fruits, nuts, and vegetables, working as a member of a crew. Segregates produce according to grade, color, and size; and places produce in containers or on designated conveyors. Discards cull items and foreign matter. Bunches, ties, and trims produce. Picks out choice produce. Packs produce in boxes, barrels, baskets, or crates for storage or shipment.

Feeds wood stock on conveyors, into hoppers, or between rollers of woodworking machines that saw, bore, sand, or shape wooden articles.

Loads hopper with metal blanks or articles to be formed, or threads strip of metal or wire through guide rollers. Starts machine and watches operation as machine automatically performs function for which it was designed.

Records alphabetic, alphanumeric, or numeric codes in prescribed sequence on worksheet or margin of source document for transfer to punchcards or machine input tape.

Pushes levers and pedals to move shovel-equipped machine, to lower and crowd dipper into material, and lift, swing, and dump contents of dipper into truck, car, or onto conveyor or stock pile.

Places eggs in saucerlike holder that carries them into machine where rotating brushes or water sprays remove residue. Removes cleaned eggs from discharge trough of machine and packs them in cases for shipment.

Situations in Which REPCON Is Not Important

Rides lead pony to lead racer and mount from paddock to starting gate of racetrack. Mounts lead pony and leads racehorse from receiving barn to paddock for saddling, for mounting by racer and to starting gate. Rides after racehorse that breaks free and aids racer to refain control of animal. (Tasks are not repetitive, breakway horses preclude set procedures and afford diversion.)

Receives and returns to owner, articles lost in stores, public conveyances, or buildings, and keeps records of articles lost, found, and claimed.

Inspects articles and sends letters to owners when identification is known. Tags and places articles in drawers, shelves, rack, or safe, according to type of article and where it was found. Discusses lost articles by telephone or in person, and returns articles to owners who can identify them. (Subject to frequent change of activity and contact with people, which provides sufficient diversion to obviate necessity for adjusting to repetitive work.)

Collects money from coin boxes of parking meters, following established route. Opens coin boxes with key and places bag under opening to receive coins. Examines parking meter to determine needed repairs or adjustments, closes, locks, and winds meter. (Repeats same tasks, but pace is not a factor and environmental conditions provide sufficient distraction so that worker is not required to make a significant temperament adjustment.)

Solicits orders for merchandise or services over telephone. Calls prospective customers to explain type of service or merchandise offered. Quotes prices and tries to persuade customer to buy, using prepared sales talk. Records names, addresses, purchases, and reactions of prospects solicited. (Worker continuously performs same tasks, but talking with people provides diversion.)

Prepares and bakes cakes, pies, puddings, or desserts, according to recipe. Mixes ingredients to form batter or dough. Shapes dough for cookies, pies, and fancy pastries. Places them in oven and adjusts drafts or thermostatic controls. Prepares and cooks ingredients for pie fillings, custards, and other desserts. Fills pie shells and tops with meringue. Mixes ingredients to make icings. Decorates cakes and pastries. (Tasks are not repetitive, and worker uses a variety of techniques.)

S — PUS

Adaptability to performing under stress when confronted with emergency, critical, unusual, or dangerous situations; or in situations in which working speed and sustained attention are make or break aspects of the job.

Consider jobs for this factor when the worker is subject to danger or risk to a significant degree, or to tension as a regular, consistent part of the job.

General Work Situations Illustrating Trait

Possesses calmness and presence of mind in critical situations.

Works under hazardous conditions.

Concentrates amid distractions.

Maintains equanimity in face of resistance, indifference, or affront.

Situations in Which PUS Is Important

Works below surface of water, using scuba gear (self-contained underwater breathing apparatus) or in diving suit with airline extending to surface, to inspect, repair, remove, and install equipment and structures. (Performs tasks in an environment that is completely hostile to his own life processes; and that also restricts his movements, length of time he may work, amount of exertion he may apply; and presents situations where risks are high and the critical or unexpected are more the rule than the exception.)

Performs surgery to correct deformities, repair injuries, prevent disease, and improve function in patients. (Exercises constant care, with no deflection of attention regardless of distractions, to avoid any of the several injuries or damages to the patient which might otherwise occur. Working speed frequently is a factor to which this worker must adjust.)

Renders variety of personal services conducive to safety and comfort of airline passengers during flight. (Must perform duties calmly and efficiently when faced with situations, such as critical illness of a passenger, severe weather conditions, or malfunctioning of aircraft which would lead to other than normal landings and procedures. Depending on the length of flight, may be under considerable pressure to perform all the required duties within a limited time.)

Controls and extinguishes fires, protects life and property, and maintains equipment as volunteer or employee of city, township, or industrial plant. (When fighting fires in buildings, must act quickly and effectively to gain access; reduce fire; and carry people out of danger or provide nets or ladders for them. Must be cognizant of toxic fumes and smoke, falling structures or debris, explosive and electrical hazards; and must protect self and others from them in calm, authoritative, and decisive manner.)

Studies nature and characteristics of atomic nuclei. (Frequently subjected to potential electrical and/or radiation hazards and must be constantly on alert to prevent injury or poisoning to self and others through radiation protection, detection, and decontamination procedures.)

Trains wild animals, such as lions, tigers, bears, and elephants, to perform stunts for entertainment of audience at circus or other exhibition, evaluating ability, behavior, and performance of each animal. (Must be constantly alert to prevent wild animals from becoming excited or getting out of control, in which state they may injure each other, their trainer, or spectators.)

Drives racing car in competition road races under constant pressure to push himself to the limits of skill, mental judgments, and endurance required to win. (Must be constantly aware of accident potential.)

Assists persons entering hospital through emergency entrances. Recognizes emergency situations and summons professional assistance or clears elevator for quick removal of person to designated floor. Assists sick or injured persons into wheelchairs or onto carts, and pushes them to elevator, office or assigned room. (Critical situations are expected to occur during this worker's work shift and while the assistance he renders is limited and nonprofessional in nature he is expected to recognize and cope with emergencies calmly and efficiently.)

Patrols State highways within assigned area, in vehicle equipped with two-way radio, to enforce motor vehicle and criminal laws. (Must react correctly, quickly, and deceisively to cope with variety of emergency situations ranging from serious accidents when the lives of others are at stake to apprehending dangerous criminals and speeding drivers when his own life may be endangered.)

Pilots new, experimental, and modernized aircraft to determine their airworthiness. Faces unknown qualities in aircraft that must be tested. (Must be constantly alert for unstable characteristics, such as tendencies to spin out of stalls, sluggish response to controls, and instability at landing speeds. Must be able to compensate for these faults to avoid crashing.)

Performs daredevil feats, such as diving stunts, perilous rides, or spectacular jumps for dramatic productions. (Must maintain strict control of mind and body to perform feats with narrow margins of safety and to react favorably when confronted with the unexpected.)

Repairs and replaces transmission and distribution powerlines between generating stations, substations, and consumers, requiring use of precautionary work methods and safety equipment due to electrical hazards present when working on or near energized conductors and electrical accessories. (Commonly works on utility poles and metal towers 100 or more feet above the ground. Most workers of this kind are well trained in first aid procedures and are expected to apply these procedures in emergency situations.)

Investigates source of alarm and trouble signals on subscribers' premises, as recorded in central station of electrical protective signaling system. (Must be prepared for anything from a simple electrical short circuit in the alarm system to a full-scale burglary or armed robbery in progress at the time he arrives at source of alarm. Apprehension of intruders found on property may require use of weapons or physical force; and in all cases the use of sound judgment and quick decisive action is required.)

Controls air traffic within controlled air space or on airport, according to established procedures and policies, to prevent collisions and to minimize delays arising from traffic congestion. Radios landing and take-off instructions and alerts airport emergency crews when airplanes are having difficulties. (Works under constant pressure. Frequently planes are stacked overhead and worker must assign holding patterns, and arrange landings and take-offs to avoid collisions.)

Parachutes from airplane into inaccessible forest to suppress forest fires. (Must cope with critical and unexpected situations occurring during his jump as well as those caused by the fire itself.)

Itemizes and totals customers' purchases in self-service grocery or department store, using cash register. (Long lines of waiting patrons induces a sense of pressure on the worker to accelerate work pace to peak capacity and requires extra caution to avoid errors.)

Mans group scanning (flash candling) station on automated egg packaging line to inspect exterior and interior of eggs and remove those not meeting quality standards. (Tension is created by the continuous emergence of six rows of eggs at a time from the dryer and the rapid rotation of 30 eggs at a time over the mercury vapor light. Exteriors are inspected before the eggs pass over the light and the interiors are inspected during the brief rotation time. This worker must adjust his pace to the speed of the conveyor which is controlled by other workers.)

Situations in Which PUS Is Not Important

Inspects buildings, issues permits, and confers with contractors and property owners to enforce State and municipal building codes. (Is rarely confronted with the critical, unexpected, or hazardous situations. Violations of building codes are considered misdemeanors and counteractions by the violator do not take an extreme form.)

Cares for elderly, handicapped, or convalescent people, acting as aid or friend, on same or acceptable social level. (Is not faced with situations that differ from normal living situations.)

Cuts away dead and excess branches from fruit, nut, and shade trees. Prunes trees with handsaws, pruning hook and shears, and long-handled clippers, or by using truck equipped with hydraulic lifts. Climbs trees, using hooks and belts, or uses ladders to gain access to work areas. (Danger of falling minimized by proper use of safety belts; and the climbing does not usually involve great heights.)

Tends machine that slides boards into slats for wooden indoor or porch shades. Adjusts guide on machine table to specified width of boards and tightens bolts. Starts machine, holds board against guide, and pushes board into blade that slices it into slats. (Hands protected by guard on machine.)

T — STS

Adaptability to situations requiring the precise attainment of set limits, tolerances, or standards.

Consider jobs for this factor when the worker must be precise, thorough, exacting, or meticulous in regard to material worked; or in activities such as numerical determinations, record preparation, or inspecting.

General Work Situations Illustrating Trait

Works to close tolerances.

Is able to control equipment to broadcast or record radio or television programs.

Stays within exact time limits.

Cuts cloth to exact pattern.

Performs arithmetic computations and prepares numerical records accurately.

Takes shorthand by machine or hand and transcribes it, using typewriter.

Situations in Which STS Is Important

Operates a billing machine to transcribe from office records data such as customer's name, address, and items purchased or services rendered. Calculates totals, new amounts, and discounts, by addition, subtraction, and multiplication; and records computations.

Compounds medicines and drugs as directed on physician's or dentist's prescription to prepare them for specified customer's use.

Brushes gold leaf onto designs on picture frames, exerting exact force.

Examines parachute parts, using glass-topped table or fluorescent light, to detect and mark flaws in material and substandard workmanship.

Tests industrial diamonds and abrasives, using optical, X-ray, and other precision instruments, to determine their suitability for use in tools, dies, and fabrication of bearings or grinding laps and wheels.

Measures dimensions of bottle, using gages and micrometers to verify that setup of bottle-making machine conforms to manufacturing specifications.

Calculates degrees, minutes, and second of latitude and longitude, using standard navigation aids, such as compass, sextant, clock, loran, charts, and trigometric tables, to locate exact position and plot courses for designated landings.

Fashions and trims component parts of wooden joints, using handtools, to make them fit snugly.

Controls audio equipment as directed and according to script to regulate volume level and fidelity of sound, and synchronize sound with picture presentation.

Wires plugboard, according to prepared diagrams, to make circuit connections that will control printing of data in designated format.

Examines bull semen under microscope to determine density and motility of gamets, and adds prescribed diluents to semen, using standardized formulas to extend volume and maintain specified concentration of viable sperm.

Tends machine containing rolls that form cooked grain into flakes, shredded biscuits, or other shapes to produce cereal products. Moves controls to start pairs of rollers rotating and to convey cooked grain to roll feeders. Turns dials and handwheels to adjust pressure of rollers, to maintain specified thickness and consistency of formed product, as indicated by feel and visual inspection.

Examines articles and advises customer of possible shrinkage, loss of shape, or other damage that might result to article during processing. Makes notation of defects in articles. Prepares work order slip. Pins or staples identifying tag to articles.

Drills and laps micro-channels in industrial diamonds, using special lathes, working within 0.0000018 inch specification tolerances, to make wire-drawing dies.

Observes pressure gages and adjusts intake and outlet valves that feed proportionate stream of city gas from mains through tank to saturate gas with malodorant, according to engineering specifications.

Prepares and verifies voter lists from official registration records. Requests identification of voters at polling places and records names against voter lists to prevent fraud or voting of unauthorized persons. Counts valid ballots and prepares official reports of election results.

Moves precisely in combination with other dancers and coordinates body movements with music, to perform chorus dances.

Situations in Which STS Is Not Important

Prepares and serves soft drinks and ice cream dishes, using memorized formulas and methods, or following written directions.

Contacts owners of forest lands from list of prospects in assigned district prior to cutting season, to negotiate contracts for purchase of trees. Walks over land to determine approximate tree yield and informs property owner of types and sizes of trees desired. (Worker is not held to precise limits or standards.)

Mixes and serves alcoholic and nonalcoholic drinks to patrons of bar, following standard recipes.

Teaches elemental natural and social science, personal hygiene, music, art, and literature to children from 4 to 6 years old

V — VARCH

Adaptability to performing a variety of duties, often changing from one task to another of a different nature without loss of efficiency or composure.

Do not interpret variety as meaning merely several. Several duties, all requiring the same or very similar skills, knowledge, and abilities do not constitute variety, which is the key word in this factor. If the several duties in a job indicate significant differences in technologies, techniques, and procedures, environmental factors and physical demands, or work situations, the analyst should consider this factor.

General Work Situations Illustrating Trait

Applies different principles and techniques of specific field to appraise or investigate condition or state of object, system, or activity.

Analyzes and overhauls machinery and equipment.

Situations in Which VARCH Is Important

Makes and repairs artificial limbs, braces, and other orthopedic appliances according to prescription. Makes cast of limb or deformity. Draws pattern. Cuts and fashions devices, using welding equipment, forge, riveting machine, drill, and handtools. Shapes parts over lasts. Pads braces. Polishes devices using buffing wheel. Adjusts nuts and screws at joints. (Different techniques and procedures.)

Performs a variety of the following or similar duties, utilizing knowledge of systems or procedures: Copies data, compiles records and reports. Tabulates and posts data. Computes wages, taxes, etc. Records orders. Gives information to and interviews customers and claimants. Receives, counts, and pays out cash. Prepares, issues, and sends out receipts, bills, policies, and invoices. Prepares inventory. Adjusts complaints. Operates office machines. Opens and routes mail. Answers correspondence. (Different techniques and procedures.)

Renders variety of personal services conducive to safety and comfort of airline passengers during flight. Verifies tickets, records destinations, and assigns seats. Explains use of safety equipment. Serves previously prepared meals. Aids ill passengers. Answers passengers' inquiries. Distributes reading material and items of convenience and comfort. Prepares reports. (Different situations and frequent change of activity.)

Maintains, repairs, and overhauls farm machinery, equipment, and vehicles, such as tractors, harvesters, pumps, tilling equipment, trucks, and other mechanized, electrically-powered, or motor-driven equipment on farms or in farm equipment repair shops. Examines machines, equipment, and engines, visually and aurally. Dismantles them, using handtools. Repairs or replaces parts, using handtools, and setting up and operating machine tools, such as drill press, lathe, milling machine, woodworking machines, welding equipment, grinders, and saws. Reassembles, adjusts, and lubricates machines and equipment. (Differences in techniques and procedures.)

Organizes and leads groups of activities that meet interests of individual members. Develops recreational, physical education, and cultural programs for various age groups. Demonstrates and instructs participants in activities, such as active sports, group dances, games, arts, crafts, and dramatics. Organizes discussions. Conducts surveys. Consults with other sources regarding specific individuals. Keeps records. (Differences in technologies and situations. Also change or involvement with more than one activity at a time.)

Supervises and coordinates activities of workers engaged in operating machines and auxiliary equipment to make bottles and other glass containers to specifications. Reviews production schedules. Requisitions molds and parts. Sets up forehearth mechanism, using gages, wrenches, and tongs. Weighs, verifies dimensions of, and inspects bottles. Observes and listens to detect machine malfunctioning. Performs supervisory tasks, such as interpreting company policies, establishing or adjusting work procedures, interpreting specifications and assigning duties, analyzing and resolving work problems, recommending or initiating personnel actions. (Differences in techniques and procedures. Differences in situations and change of activities.)

Arranges schedules for irrigation of farms and orchards according to water rights or amount of company stock held, and controls water flow through pipeline system. Confers with customers. Analyzes needs and schedules irrigation. Patrols pipelines. Raises and lowers pipeline gates. Cleans, lubricates, and repairs equipment. Inspects dams. Maintains records. Prepares monthly statements. Writes reports. (Differences in physical activities and techniques and procedures.)

Cares for animals, such as mice, dogs, and monkeys, used in medical and technological tests and research. Weighs or measures, grinds, chops, and mixes ingredients to prepare animal food. Feeds and waters animals. Records food consumption. Leads or carries animals. Shaves operative area. Administers anesthetics. Cleans and sterilizes cages, pens, and surrounding areas using steam or germicidal solutions. Exterminates insects. Repairs cages and equipment. Orders feed and supplies. (Significantly different techniques and procedures; different physical activities. Frequent change of activities.

Accommodates hotel patrons by performing the following duties. Registers and assigns guests to rooms. Gives escort instructions. Date-stamps, sorts, and racks mail and messages. Transmits and receives messages, using telegraphic devices and telephone. Answers inquiries. Maintains records of rooms and accounts. Collects payments from departing guests. Makes and confirms reservations. (Frequent interruptions and change of activities; different procedures.)

Acts as house manager, advisor, and chaperon for boarding school, college fraternity or sorority house, children's home or similar establishment. Hires housekeeping personnel and assigns duties. Orders supplies. Plans menus. Determines need for maintenance and repairs. Assigns rooms. Assists in planning recreational programs. Chaperons group-sponsored trips and social functions. Answers telephone. Sorts and distributes mail. Compiles records. (Differences in procedures.)

Prepares specimen for museum collections and exhibits. Cleans fossil specimens using electric drills, awls, dental tools, chisels, and mallets. Applies preservatives, such as plaster, resin, and shellac. Molds and restores parts, using molding and casting techniques. Constructs skeletal mounts, using machinist's, plumber's, carpenter's, and welder's tools and equipment. Casts or molds duplicate specimens. Reassembles fragmented artifacts. Cleans, catalogs, labels, and stores specimens. Maintains museum files. (Differences in technologies requiring different techniques and procedures.)

Plans itinerary for hunting and fishing trips. Guides and transports sportsmen to hunting and fishing areas. Plans route. Drives motorboat or land vehicle. Poles or paddles watercraft. Prepares meals. Explains hunting and fishing laws. Recommends guns or tackle. Gives first aid. May feed, water, and care for animals. (Differences in techniques, procedures, environmental conditions, and physical demands. Differences in situations implied.)

Coordinates activities of international traffic division of railway-express agency and negotiates settlements between foreign and domestic shippers. Plans and directs flow of air and surface traffic. Supervises workers engaged in receiving and shipping freight, documenting, waybilling, assessing charges, and collecting fees. Negotiates with foreign and domestic shippers. Prepares reports. (Frequent change of activities.)

Overhauls, repairs, modifies, and tests aircraft instruments, using precision handtools and following blueprints, work orders, and manufacturer's specifications. Tests instruments, such as gyroscopic turn-indicators, compasses, pressure regulating valves, tachometers, transducers, watches, and timers, using devices such as ohmeters, voltmeters, micrometers, pressure gages, and vacuum-pump testers. Records results. Diagnoses malfunction. Disassembles faulty instruments, using handtools. Replaces defective or worn parts. Grinds and machines new shafts and other parts, using jeweler's lathes and precision grinders. Magnetizes or demagnetizes parts, using special shop equipment. Cleans and lubricates parts. Reassembles and retests instruments. Engraves new instrument dials, using engraver's tools. (Different procedures and techniques.)

Constructs and repairs wooden articles, such as store fixtures, office equipment, cabinets, and high-grade furniture, using woodworking machines and handtools. Studies blueprints or drawings. Marks outline or dimensions. Matches materials. Sets up and operates woodworking machines. Trims parts of joints. Bores holes. Glues, fits, and clamps parts and subassemblies. Drives nails or other fasteners.

Sands and scrapes surfaces and joints. (Different techniques and procedures.)

Teaches elemental natural and social science, personal hygiene, music, art, and literature to children from 4 to 6 years old, to promote their physical, mental, and social development. Provides wide variety of experiences by means of dramatic play, story telling, field visits, and group discussions. Fosters cooperative social behavior through games and group projects. Encourages students in singing, dancing, rhythmic activities, and use of art materials. Alternates periods of strenuous activity with rest or light activity. Instructs children in personal cleanliness and self-care. Evaluates progress. Discusses progress and problems with parents. (Different techniques and procedures. Frequent change of activity.)

Demonstrates, sells, and services sewing machines. Explains and demonstrates how to thread, adjust tensions, use attachments, and sew various stitches. Writes sales slip or sales contract. Receives payment and secures credit authorization. Delivers machine. Lubricates, repairs, and adjusts machine in customer's home, using handtools. Contracts for machine rentals. Collects payments. (Different techniques and procedures.)

Observes details of work and interviews workers and supervisors. Develops interview techniques, rating scales, and psychological tests. Organizes training programs. Counsels workers. Investigates problems. Conducts surveys and research studies. Studies consumer reaction to new products and package designs. (Different situations; different techniques and procedures.)

Patrols oil and gas pipelines and communication systems on foot, horseback, or in automobile, to locate and repair leaks, breaks, washouts, and damaged utility wires and poles. Inspects pipelines. Repairs small leaks, using calking tools, hammers, clamps, and wrenches. Reports large leaks to district office. Inspects telephone and telegraph wires, poles, and insulators. Reports findings. Inspects automatic drip bleeders. Adjusts or repairs bleeders, using screwdriver and wrenches. Installs and replaces warning signs. Writes reports of inspections. (Differences in physical demands and techniques and procedures.)

Services automobiles, buses, trucks, and other automotive vehicles with fuel, lubricants, and accessories. Fills fuel tank. Adds required amounts of oil to crankcase and water to radiator and battery. Washes windshield. Lubricates vehicle. Changes oil. Replaces accessories, such as oil filter, air filter, windshield wiper blades, and fan belt. Drains radiator and fills with specified amount of antifreeze. Changes spark plugs. Repairs or replaces tires. Replaces lights. Washes and waxes vehicle. Collects cash for services or supplies or completes credit form. (Different techniques and procedures.)

Situations in Which VARCH Is Not Important

Overhauls and tests aircraft ignition system components using handtools and testing devices such as ammeter and voltmeter. (The number of components and tools and differences in techniques do not require significant temperament and adjustment.)

Coats, decorates, glazes, retouches, or tints articles, such as fishing lures, toys, dolls, pottery, artificial flowers, greeting cards, and household appliances. Uses a single tool and usually works with only one kind of product. (No differences in technique.)

Estimates liability of uninsured motorists involved in accidents to facilitate application of penalties and bonding requirements of state law. (The variety of data involved does not require temperament adjustment. Duties are closely related.)

Operates one or more hand- or power-fed woodworking machines to surface, size, or joint lumber, or to cut tongues, grooves, bevels, beads, or molding patterns. Must be able to operate several machines to accomplish different cuts. (Works with a single technology, and the techniques and procedures are closely related. Does not change from machine to machine with sufficient frequency to require a temperament adjustment.)

Procedures For Rating and Recording Temperaments Requirements

Evaluate all of the situations in the job being analyzed for all possible temperaments factors. Refer to the illustrations for assistance.

Select those factors that you consider to be important in relation to the kinds of adjustments which the worker must make for successful job performance.

Encircle the appropriate single-letter symbols of the factors selected in step 2 in the worker traits section of the job analysis schedule (Item 6).

Use the multiple-letter symbol in addition to the single-letter symbol when referring to a temperaments factor in the comments section of the job analysis schedule.

192

GLOSSARY OF TERMS

for the

STANDARD OCCUPATIONAL CLASSIFICATION (SOC)

SYSTEM DEFINITIONS

National Center for Research in Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

INTRODUCTION

The Standard Occupational Classification (SOC) represents a collection of occupations that are grouped under a common title based on similarities of the work performed. The SOC identifies, classifies, and defines these occupations in four major categories -- division, major group (2 digit level), minor group (3 digit level) and unit group (4 digit level). Each level is more specific than the one that precedes it. The definitions for each title include a short introductory paragraph that describes the work performed and some of the tools and equipment used. In most cases, the description may also provide sample work activities, hours of work and travel, and sample places of work.

Since the introductory paragraph will probably be the most frequently used portion of the definition, this glossary was developed to define some of the terms that may be unfamiliar to the user. In some cases, contextual clues are provided for difficult or technical terms; however, when this is not done, the glossary should be consulted.

The glossary is arranged in alphabetical order and contains over one hundred words identified by the review panel, as a part of the evaluation process. Each word entry in the glossary contains a short definition and a two, three, or four digit number that corresponds to the title in which that term is used.

A

abutment(s) - a bridge support 64,641,6413

aerospace - relating to atmosphere and space 2249

analytical - mathematical 17

appraise - to fix the value of something 43,252,4123

appraiser(s) - a person who determines the value of an article or product 44

arboretum(s) - a garden of trees 25,252

artifact(s) - an article produced by human skill 25

asthma - a disorder that affects breathing 3031

audit(s) - to examine an account 3971

B

bailiff - an assistant to the sheriff 4799

bereaved - taken by death 2042

braille - written information for the blind 235,4792,4793

braze - to solder two pieces of metal together 753

buffer(s) - a device that lessens schock 6824

C

caliper(s) - a tool for measuring dimensions 6831

census report(s) - a count of people 4794

chaperone - a person who watches young people 5264,5269

cleft palate - a split in the roof of the mouth 3034

collator(s) - a machine that puts papers in sequence 6154

combine(s) - a harvesting machine 6118

conduit(s) - a large pipe 8643

consultant(s) - a person who gives advice 185

corporation - a business company 5522

crown(s) - top of the tooth 6865

cutlery - knives 7522

D

decode - to figure out 39,399

delegate - to give authority to someone else; to appoint 1099

derrick - a lifting machine 652

dialect - a special speech form 3034

dictate - to say or read alout something to be recorded or written by another 4633

dictation - a process in which a person writes or transcribes the spoken work of another 4622,4623

disability(ies) - a loss of powers 3033

dispense - to supply with 301

disperse(ing) - to distribute or pass out 475

doctrine - a principle; something that is taught 204

draft(s) - a rough copy 4624

dredge (noun) - a scoop-like tool 583

dredge (verb) - to dig or scoop 83

E

electrode(s) - an electrical pole 7215

electroplate - to coat electrically 7099,1312

emboss - to decorate with raised figures 472,744,764

etching tool(s) - a tool used for imprinting designs on metal 6823

expeditor(s) - a person who speeds a process 475

exterminate - to get rid of 524

F

forge(s) - a furnace 7519,6821

float(s) - a tool used to make a surface level or smooth

franchise - a chain of businesses 4249

G

glaze - a smooth, glossy coating 7472

grade - to rate a product in terms of quality 5672

H

hearse(s) - a large automobile which carries the dead 8216

hoist(s) - a device for lifting 652

hone - to sharpen 6171,7324

horoscope - a forecast of a persons' future based on the positioning of the planet and stars at the moment of birth 328

horticulture(al) - flower growing 552

hydraulic - a device that works by liquid pressure 6113

I

implement - a tool 5616

ingot mold - a casting mold for metal 8641

inlay(s) - a special repair on a tooth 6865

interest - pay for the use of money 4712

inventory - a listing of property 4511

invoice - a list of goods 471, 4712

J

K

L

lap - a part folded over 7324

lathe(s) - a turning machine 743,6864

ledger(s) - an account book 4712

legislator(s) - a lawmaker 11

levee(s) - a bank designed to protect against water floods 5615

liability - a total of debts 1414

limousine(s) - a large automobile 8216

M

mannequin(s) - a life size representation of the human head or body

micrometer(s) - a tool for measuring small objects 6831

molten - melted 6861,7342,8611,7717,7759

mooring line(s) - a rope to fasten ships 8243

N

O

optic(s) - relating to the eye 1639

optometrists(s) - a person who examines, measures and treats certain visual defects

P

parasite(s) - an organism that lives off others 1855

pelt(s) - a fur-bearing animal skin 58,584

philosophy - the study of truth 1914

pier(s) - a supporting structure 6413,6476

pig iron - crude, unfinished iron 754

podiatrist(s) - a foot doctor 2599

port - a place where ships dock 1638

power winche(s) - a power lifting device 8313

prescribe - to order as a remedy 27

primer - a paint undercoat 6442

propose - to present 11

Q

quench - to cool 7544

R

resolve - to clear up 4511

retrieve - to get back again 4613

retrieving - locating 469

R(cont.)

rigging - a ship's ropes 8241

rivet(s) - fasteners or bolts 6113,6812,6829,7675

S

sacraments - religious ceremonies 204

scaffold - a temporary, elevated platform 642,871,6422,6424,6442,8643

securities - stocks and bonds 471,4733

seine(s) - a large fish net 583

seminar(s) - a meeting designed to exchange ideas 22

sheltered workshop - a business operation designed to employ and train handicapped persons 127

shorthand - a shortened form of writing 4623

skid(s) - a timber for sliding heavy objects

specification(s) - a detailed plan 1637

specimen(s) - a sample 369

soldering iron(s) - a gadget that joins metals 6155,6812,6824

solvent - a mixture that dissolves dirt 6835

sonar - a direction finder 3711

statistic(s) - a numerical interpretation of information 364,3712

stenotype - a form of shorthand 4623

symptom(s) - a sign or signal 29

T

template(s) - a pattern 6817,6839,7313,7431

therapeutic - healing 2899,2830

trowel - a tool for leveling, shaping, or spreading 6444,6465

U

V

vaccine(s) - a protection from disease 27

veneer(s) - a thin coat of wood 743

volt meters - a device for measuring electricity 6155

vouchers(s) - a receipt; a statement that proves the terms of the transaction have been met 4712,4716

W

weapons deployment - to spread out to form an extended front 2249

winch - a lifting device 8239

wirephoto - picture sent by wire 4739

X

Y

Z